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Institute Interested in Price Situation

President Gary's Address Discusses Business Conditions in Conservative Terms—Record Attendance at Eighteenth General Meeting—Valuable Papers Presented

HE American Iron and Steel Institute, at its eighteenth general meeting, held at the Hotel Commodore, New York, last Friday, established a new record for attendance with a registration amounting to 1600, compared with a previous record of about 1400 a year ago. The number who attended the banquet was 1500, compared with 1330 in October, 1919, and 1321 in May, 1920. The meeting was characterized by the keenest interest in present business conditions, especially the price situation. Some of those in attendance had expected, or at least hoped for, a definite announcement of price policy by Judge Gary, but it was generally recognized that, so far at least as his own company was concerned, he was not in a position as president of the institute to make a definite statement. Those who were hoping for some intimation that prices might be advanced were especially disappointed, for the trend of the discussion of the business outlook by Judge Gary indicated a belief that prices generally ought to be revised downward, although there was nothing in his paper to indicate that there would not be a raising of prices on steel rails or other products, for which action it may be decided there is special reason. Judge Gary gave an extremely interesting account of his trip to France and Belgium. He dwelt particularly upon the great achievement of the American army in the Argonne Forest, of which he said:

"This great victory broke the German army's back. There was never afterward any hope for victory to the arms of the Central Powers.

"When all the facts and figures are assembled, authenticated and published, I think it will be generally admitted General Pershing at Argonne led the largest independent army and gained the greatest single victory in the history of battles. All honor to him and to the multitudes of men who fought under him!"

This declaration was greeted by enthusiastic applause. Judge Gary carefully avoided any discussion of matters that might be considered partisan, or even political. Only once did he speak of the League of Nations, which he did in the following paragraph:

"Before I left the United States for Europe, I heard it stated on more than one occasion that Frenchmen were much dissatisfied with, and in fact more or less bitter toward, the attitude of Americans concerning the after-effects of the war. Naturally, I took particular pains to ascertain the facts

in regard to these matters. It was my good fortune to meet large numbers in France, including working people, shopmen, business men, newspaper men and public officials, and I am fully satisfied that there is no just ground for the assertions referred to. There may have been utterances of this kind by a few, but, if so, they do not represent the current of opinion. I heard only one unfavorable criticism and I think it was made on the basis of a misunderstanding. It related to the proposed League of Nations and it was made under the mistaken belief that the American people had promised to ratify the proposed league in the form reported. The French are very friendly toward Americans, and they are deeply grateful for the service rendered during the war. The relations between these two countries are more cordial and better than ever before, and they ought to be. Emphatically this sentiment also applies to Belgium."

The technical papers were of the usual high order. Those of F. L. Toy on "The Basic Open-Hearth Process," and E. A. Wheaton on "The Use of High Manganese Iron in Basic Open Hearth Practice," are worthy of special mention, while Walther Mathesius, as upon other similar occasions, made a valuable contribution in his paper on "The Blast Furnace Hearth."

At the banquet, Friday night, at which 1500 members and guests were seated, Judge Gary presided. He stated that President James A. Farrell, of the Steel Corporation, was unable to be present on account of a temporary illness and proposed that the guests drink to his health, which was done with enthusiasm.

Judge Gary also explained that General Pershing had been expected, but he likewise was detained at home by illness. The members drank to his health and also to that of the ladies who graced the balcony by their presence.

The formal speeches of the evening were on "Thrift in Coal," by George Otis Smith, director of the United States Geological Survey, Washington, and H. C. Estep, European manager of the Iron Trade Review, on "European Iron and Steel Two Years After the War," read by John A. Penton, president Penton Publishing Co., Cleveland.

After the reading of these papers, Judge Gary remarked: "As the hour is rather late, I have decided to allow only one more speech to be made; you are to name the speaker." Of course there were shouts for "Schwab," and the chairman of the

Bethlehem Steel Corporation responded in his usual happy manner. After telling some positively new stories, he spoke more seriously for a moment, dwelling upon the fact that the frequent meetings of the institute impressed more and more upon the members that there is something more in life than dollars. He said that it was a great joy to him to

look back over an acquaintance of more than 40 years with the men of the iron trade, to renew old acquaintances and to meet the younger men who are coming to the front. He urged his hearers to meet their troubles with a laugh, and to foster the friendships which have been formed and will be formed by the men engaged in the great industry.

President Gary Discusses Business Conditions

Present Tendency Toward a Lower, More Reasonable and Fairer Relative Basis — Foreign Manufacturers Will Be Glad to Hold International Meeting

PRESIDENT GARY'S discussion of business conditions was in full as follows:

"Although this is a time for courage, composure and caution, the business skies are practically without clouds. As always, there may be showers from time to time, but there is nothing in the atmosphere to indicate the approach of dangerous storms. It is up to the business men and women to maintain certain and continuous business activity in satisfactory volume with fair and reasonable profits. If there should be a serious reaction and depression, which now seems improbable, it will be the fault of those who are connected with business operations or others who, by reason of official positions, improperly interfere, and not because of any fundamental deficiencies in our resources and opportunities. We may without hesitation face and discuss any and all facts that bear upon the subject of future economic progress, and we may frankly and openly admit any truth which concerns the immediate future even though it might, in some respects and to some minds, appear to be unfavorable.

Reduce Equitably and Relatively

"In certain lines of the iron and steel industry there have of late been some decreases in the volume of new business and also voluntary reductions in selling prices. I consider this decidedly healthful. All, or nearly all, of us have for months been unable to supply the demands of our customers as to quantities or deliveries and our prices, considered as a whole, have resulted in As a matter of course some adjustments will need to be made. The average of the general scale ought to be reduced equitably and relatively. Without referring to individual cases or lines of general business, I believe in many instances prices have been outrageously high. This observation applies more especially to middlemen, so called, and to smaller departments of industry. It also includes employees in certain trades; but it does not pertain under present conditions to the masses of workmen.

Labor questions are always under consideration in this country and others. It should be constantly borne in mind that, in order to secure the best results to both employee and employer, mutual confidence and friendly co-operation are essential.

The present tendency is toward a lower, more reasonable and fairer relative basis. The whole community desires and strives for this. The difficulty is found in the fact that every individual is perfectly willing that all others shall make reductions—the larger, the better. As there was, more or less, a scramble for higher and still higher prices when they were advancing, there will be just as much selfishness in the enforced use of brakes when there is a tendency toward decreasing prices. Now a general public, including particularly those who are neither sellers nor buyers to a large extent, will in one way or another bring about a fair and reasonable adjustment of prices. The law of supply and demand vill be the principal factor.

"We naturally ask ourselves what shall we person-

"We naturally ask ourselves what shall we personally do; what shall be our attitude in these circumstances? I answer: We must evidence the same disposition which was displayed before the Industrial

Board in March, 1919, when our steel committee cooperated with the Government's representatives in the endeavor to secure a general, equitable, orderly and methodical reduction in the prices of all commodities and services: We would have succeeded except for the sudden change in the attitude of the Administration which resulted in the abolition of the Industrial Board and thus limited the leaders in the industry to their own resources. Notwithstanding that episode we have done since then much to prevent unreasonable advances and at present we are called upon to exert a further steadying influence upon the general situation. Let us be reasonable and just, reducing our prices if and when other reductions and costs permit, and then with level heads, clear minds and honest convictions, stand solid as against panie or lack of confidence in the industrial situation. Let us strive to be right. If we are right we can be determined and courageous. Let us as individuals consider the interests of all others. Our business is basic. It is perhaps one of the most important. We may, we must, exert an influence for stability throughout the business world at a time when readjustments are, more than usual, liable to provoke disturbed conditions.

Reason for Confidence

"The people of the United States have reason for confidence in the business future. They need not be discouraged nor impatient. They have only to look about them and study the facts and figures. We have recently had opportunity to read the report of the Comptroller of the Currency. He informs us that the resources of all the banks of the United States break all records and exceed the combined bank assets of all other leading nations of the world and that they now amount to \$53,079,108,000, not including Federal Reserve banks! Compare this with the time of Alexander Hamilton, Secretary of the Treasury of the United States, who wrote under date of Feb. 26, 1793 to the president, directors and company of the bank of the United States:

I have to request that you will be pleased to advance to Samuel A. Otis, Esquire, the sum of \$15,972.20 on account of the compensations due to the senators of the United States.

As I have been informed that the bill, making appropriations for the present year, has passed both houses of Congress, I hope to have it in my power very shortly to replace this sum, as well as the monies which have been hitherto advanced by you for the public service, in compliance with my several requisitions for that purpose.

Not Proud or Indifferent

"You are familiar with the total wealth of the United states and the value of the yearly production. I have previously referred to them, and made comparisons with other countries. Our people should be thankful but they may not be proud nor indifferent toward others. They have great responsibility. They will size up to it. Occasionally there will be unpleasant vicissitudes. There will be agitators abroad in the land endeavoring to create dissatisfaction and disturbances, sometimes masquerading as reformers. There will be secret enemies of our country; and all right-thinking people must be on their guard. Love of country is the

AUTHORS OF PAPERS READ AT MEETING OF AMERICAN IRON AND STEEL INSTITUTE

A LEXANDER H. HOLLIDAY, who presented the paper, "Foreign Trade," is manager of exports of the Jones & Laughlin Steel Co., Pittsburgh. He has been identified with the steel industry for 23 years. His first connection with the industry was with the Park Steel Co., Pittsburgh, having served three years with that company in its claims department. He joined the Jones & Laughlin Steel Co. 20 years ago

A. H. HOLLIDAY

and for 14 years was special agent of the company in charge of claims and adjust-With the organizaments. tion of the export department of the company on July 15, 1915, he was named as its manager and since has occupied that position. He is a native of Brookville, Pa. He is an associate member of the Engineers' Society of Western Pennsylvania, a member of the Duquesne Club, the Pittsburgh Chamber of Commerce and the Highland Country Club.

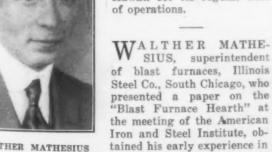
GEORGE OTIS SMITH has been director of the United States Geological Survey since 1907. The day

following his graduation from Colby College in 1893, he started for the West and joined a geological survey field

party, and later, on obtaining his degree of Ph.D. in 1896, Johns Hopkins, received a regular survey appointment. His scientific work included official investigations on the subjects of areal, structural and mining geology, confined chiefly to the States of Washington, Utah, Michigan, North Carolina and the New England States. To the position of director of the Geological Survey Doctor Smith brought a broad experience in the scientific work of the Geological Survey as well as an appreciation of business methods. Since taking up administrative work, his publications have been largely public addresses devoted principally to the discussion of economic and civic subjects. Some of these more recent addresses have been: "Industry's Need of Oil," "Engineering as Prosperity Insurance," "A Geographic Study of Geology," "Planning for Power," "Fluctuations in Coal Production," "The Engineer and National Prosperity "The Public Service Opportunity of the Oil

Geologist." The Geological Survey is well-known as one of the largest scientific bureaus of the Government.

A great part of its work during the past ten years, and especially during the war, has been economic and highly utilitarian. It carries approximately 1000 employees on its rolls and has the entire United States, Alaska and Hawaii for its regular field of operations.



Germany, where from 1904 to 1906 he was employed in various operating capacities at several blast fur-naces and steel plants. In 1906 Mr. Mathesius entered the Technical University of Berlin, where he specialized in ferrous metallurgy and was granted his master's degree in 1910. Remaining as assistant professor at the university for a year, he was given his doctor's degree in 1911 as the result of a treatise on "Magnetic Properties of Manganese and

Nickel Steels."

In 1911 Mr. Mathesius came to the United States and joined the research laboratory of the American Steel & Wire Co. A year later, he became assistant superintendent of blast furnaces 1 to "E," South Works of the Illinois Steel Co., from which he was promoted to his present position of superintendent in 1917. Mr. Mathesius read a paper on "High Blast Heats in Mesabi Practice" before the American Institute of Mining Engineers in 1915, and at the 1917 meeting of the American Iron and Steel Institute presented a paper on "Chemical Reactions of Iron Smelting."



D. M. BUCK

GEORGE OTIS SMITH

D. M. BUCK, who presented a Review of the Development of Copper Steel, was born in Mercer County, Pa., in 1877. After completing a high school course, he spent several years at Thiel College, going from there to Case School of Applied Science, Cleveland, where he graduated with the degree of Bachelor of Science in 1900. He later received the degree of Chemical Engineer from the same institution. He went with the Crucible Steel Co. as assistant chemist in 1901, and with the American Sheet & Tin Plate Co. as chief chemist in 1903. He has been with the latter company ever since in the capacity of chief chemist and metallurgical engineer. He has specialized largely on coated metals and corrosion. He is a member of Duquesne Club, University Club, Pittsburgh Field Club, all of Pittsburgh; Chemist Club, New York, and Cosmos Club, Washington.

E. A. WHEATON, author of the paper on the use of High Manganese Iron in Basic Open Hearth

Practice, was born in 1889, and graduated from Lehigh University in 1912 with the degree of metallurgy. He became associated with the Bethlehem Steel Co. in 1912 in their chemical laboratory; was transferred to open hearth No. 1 during the early part of 1913, becoming assistant superintendent shortly In December, 1915, after. Mr. Wheaton was transferred to open hearth No. 3 in the capacity of assistant superintendent, and was appointed superintendent of this department in 1917, which position he now holds.



E. A. WHEATON

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rule. Indeed it is the habit.

"I think the members of the iron and steel industry of the United States, up to the full limit of propriety, should co-operate with those of other countries. I have information that many foreign manufacturers will be glad to participate with us in another international meeting. In the near future, questions pertaining to this subject will be discussed by your board of directors, to whom you have always delegated full authority.

"The onward march of progress is moving rapidly. We may and will be a part in the procession and, in a measure, assist in guiding the course. I have hereto-

fore publicly said, quoting from the Bible: 'As no man liveth to himself so no nation liveth to itself.' This is applicable to the present period.

"When we consider the world's disasters, destructions, agitations, distrusts and vicious propaganda, the wonder is that business during the last few years has been so good and our country so prosperous as it has been. Gentlemen, the earth is still regularly turning on its axis, the seasons come and go, the fields laugh with the harvests, the mines and wells yield their riches, the morals of the people in general are improving and an overruling and just Providence is surely controlling the destinies of men and nations."

Prospects for Foreign Trade

A. H. Holliday on Important Factors of the Situation-Loss of Steel Production to Peaceful Arts During the War

A. H. HOLLIDAY, manager of exports Jones & Laughlin Steel Co., Pittsburgh, in the paper on Foreign Trade, spoke in part as follows:

"The world demand for the next decade will consist of five principal factors, namely:

Present normal demand;
 Replacement of world's loss of production during war

years;
3. The inevitable increase due to rehabilitation;
4. Natural expansion of demand;
5. The development of countries hitherto virtually undeveloped, but now awakened or awakening to full national

"1. The present normal demand we can readily gage

by figures in evidence before the war.

"2. The world's loss of production to peaceful arts is difficult of determination, but with the figures of world production now quite fully obtainable for the war years, we have evolved the following theory of analysis and computation of the loss based on steel ingot and casting production:

"For the United States, the United Kingdom, France, Germany, and Russia, the diversion of production from peaceful art to war purposes:

"For Belgium, non-production. "The application is as follows:

Steel Production of the World and Estimated Loss to Peaceful Arts During World War Period, 1914-1918.

		Loss to Peaceful	
	Production*	Arts	Loss
Countries	(Gross Tons)	(Per Cent)	(Gross Tons)
United Stales	.187.960.785	50	93,980,393
United Kingdom		66 %	29,984,728
Germany		100	74,655,839
Belgium	. 1.585,207	Total at pre-	
		rate of proc	lue-
		tion	10,582,255
France	. 9.581,775	100	9.581.775
Russia	. 17,744,196	66 %	11,829,464
Total	.336,504,894		230,614,454
All others	. 31,187,924	66%	20,791,948
Grand total	.367,692,818		251,406,402

^{*}Steel ingots and castings.

"The production of the world, as above outlined, amounted during the war years to 367,692,818 gross Allowance for unavoidable inaccuracies of various kinds must be made in reaching conclusions. must also make allowance for the reclamation of steel diverted to war purposes.

"However, by disregarding the odd 51,000,000 gross tons of the total estimated world's loss of production above obtained, we arrive at what we believe to be a safe minimum of 200,000,000 gross tons lost to peaceful arts. All or most of this tonnage is likely to be required by the world, in addition to the demand that otherwise would exist. This tonnage will exercise a strong supporting influence on the world's markets for many years to follow.

"3. Rehabilitation has probably been much overesti-

mated and will likely prove to be of interest on a rapidly diminishing scale to the steel manufacturers of the United States, as war's destruction will be supplied largely by the several countries affected or by their European neighbors. Nevertheless, in terms of world supply and demand this condition will have an influence beneficial to the industry as a whole.

"4. Natural expansion can be gaged measurably by the upward curves of world production and consump-

tion in the years preceding the war.

"5. The further development of countries hitherto but little developed or now in condition of political, social, and economic chaos, coupled with the expansion of those countries in which substantial progress has already been made, is a subject which staggers the imagination, but which in its very nature is indeterminate at present. By way of illustration, the per capita consumption of China and Japan for 1918, based on the conservative estimate of 383,000,000 combined population, was 6.5 pounds of finished steel as compared with the United States per capita of 517 pounds for 1913 based on 98,000,000 population. Gaged by population, natural resources, increasing national consciousness, with expanding economic development, the human desire for comforts and luxuries, we may fairly conclude that the world's every effort toward increased steel production will be assimilated quickly with an insistent demand for still further tonnages.

Competition

"Competition next engages our attention. Obviously, for our purposes, the nations of the world divide into two classes: manufacturing and non-manufacturing. The United States, Canada, the United Kingdom, Germany, France, and Belgium, with Russia in the background, embrace the former, while, broadly speaking, the remainder of the world embraces the latter. It may be assumed safely that the manufacturing countries of Europe, ultimately at least, will serve largely their own needs and those of contiguous nations of both manufacturing and non-manufacturing classes and that the remaining non-manufacturing countries will be the fields of active competition. This does not imply, however, that as among ourselves and other manufacturing countries there will not be a substantial interchange of raw material, semi-finished and finished products, together with other commodities into which iron and steel largely enter.

"The true significance of the term 'Foreign Trade' lies in the following: One most important economic principle is, that productivity, by enabling the interchange of commodities with others, is a sound basis for human prosperity and happiness. Hence, in addition to our own efforts in this direction we should encourage foreign lands to produce in exchange for our own products those commodities which we can ourselves use or dispose of to others and we should supply the machinery, financial and otherwise, for this interchange.

has an acute present application in view of the general

dislocation of finance throughout the world.

"Our ability to meet competition involves prices, quality, service, men fitted and trained for the work both at home and abroad, extensive reciprocal purchases of foreign products, flexible and satisfactory credit arrangements, and the encouragement of our nation as a whole to liberal, but wisely selected investments in foreign enterprises and securities. These will in turn require a high order of banking, cable, mail, and transportation facilities, both inland and ocean.
"We have been slow to take advantage of the op-

portunities forced upon us by the war. We have not yet surrounded ourselves with the atmosphere of foreign trade. In consequence we suffer by comparison with those other manufacturing nations to which foreign trade is their life blood and whose every activity is

directed to that end.

"The magnitude of the prospect must not lead to complacency. Eternal vigilance and progress will be the price of success. We must not underestimate the strength and good qualities of our competitors; rather we should seek to emulate them. When we consider the past accomplishments in foreign trade of our recent allies, and the splendid manner in which they have girded their loins for the renewed conflict after the disheartening experiences of the war and the tremendous difficulties under which they now labor, we are forced to cry aloud our admiration.

Altruism and Expediency

"We should meet the present situation from every angle in a spirit of liberality and helpfulness toward re-cent foes as well as allies and neutrals. Expediency alone suggests this course. Germany was the keystone of Europe's industrial arch. A restored Europe with-

out a properly functioning Germany is inconceivable. An unrestored Europe means chaos, anarchy, and death to millions struggling for the necessaries of life. Such measures as are taken for the economic restoration of Germany must, of course, involve an irreducible minimum of menace to the national existence of her neigh-The world has become internationalized. concern of one is the concern of all.

Conclusions

"One of the finest guarantees of the foreign trade principle, its validity and its continuity, is the note of high altruism which during recent years has been sounded in public and private utterances. It is no longer Export Trade but Foreign Trade. We have ceased to hear that 'There is no sentiment in business.' Instead, constructive helpfulness is emphasized. We are imbued

with the world spirit.

"Foreign trade is the romance of business. In no other department of commercial endeavor does the mind run so far afield; over and under oceans; across plains and deserts, over mountains, by cable, by vessel, by railroad, by wireless telegraph and telephone, by aeroplanes, to the far corners of the earth. And in the midst of vital business considerations we pause to think of the character, the environment and welfare of those

with whom we would traffic.
"'Where there is no vision the people perish.' well religion without belief in the supernatural, as for-eign trade without optimism. The issue is very real and will require courage for its successful accomplishment. We have moved but a small part of the way, but we have the natural resources, the wealth, the mills, the executives and the workers, with their combined inventive genius, the railroads, the ships and those to man them. It we do not seize the opportunity, others will."

The Blast Furnace Hearth

Large Dimensions an American Accomplishment -Objections Considered and Advantages Claimed BY WALTHER MATHESIUS*

ONE of the incidental yet not negligible advantages of the larger hearth is its greater accessibility. With increased diameter, greater peripheral distances result for arranging feed and discharge pipes for cooling water, more working space is available around the tuyeres, blow stocks, and the columns as well as between the iron and cinder runners near the furnace so that, on the whole, the cast house work and also the mechanical maintenance become easier and simpler.

In order to illustrate the extent to which hearth dimensions have grown in recent years, I might mention that the average hearth diameter of all 22-ft. bosh furnaces at the South Chicago plant of the Illinois Steel Co. was increased from 16 ft. 6 in. in 1911 to 18 ft. 6 in. in 1919, and that the best average monthly production of these same furnaces equalled 512 tons per furnace per day in December, 1911, as against 556 tons in May, 1920. For this increased output the adoption of larger hearths is primarily responsible, no enlargement of the furnaces or important changes of lines above the bosh having been made. During the same time our fuel conditions have developed no permanent improvement but have rather experienced a decided change for the worse. The fuel consumption per ton of iron for the two periods cited above were 2053 lb. in December, 1911, and 2037 lb. in May, 1920.

In this connection I wish to point out that with this development of hearth dimensions the old practice of comparing furnace performances on the basis of their daily pig.iron output per square foot of hearth area, is no longer applicable. It will be readily understood that this method of calculating furnace ratings, while capable of furnishing reasonably equitable data where hearth sizes bore the same relation to furnace dimensions as a whole, must naturally cease to be of value, as soon as hearth diameters are increased beyond the customary proportion to other furnace measurements.

Modification of the Stack Lines

Lately larger hearths have also enabled modifications of the stack lines, which were not practicable before, although their desirability had been felt for some time. Particularly for operations where soft, easily reduced ores are used which are known to have a tendency to swell under the influence of the reducing furnace gases, the suggestion had been made that the uniform descent of the stock might be facilitated by increasing the batter of the stack lining, thereby reducing any "jamming" tendencies as well as friction.

One way to obtain this would seem to require merely a decrease in the diameter of the stock line. This, however, did not appear to be permissible on modern fast driven furnaces, using a large percentage of fine ores, since the gas velocity at the stock line which, all other things being equal, must necessarily be determined by the available area, was known to be so high in many cases as to keep the surface of the charge in more or less constant agitation. Thus, the limit would be closely approached beyond which dust losses would The diameter rapidly grow to excessive proportions. of the bosh, on the other hand, appeared to be definitely controlled by the limits of hearth dimensions and bosh angles. The only means remaining then of obtaining at least a slight increase in the stack batter, was to carry the straight stock line section down lower into the furnace and thereby reserve the relief offered by a greater outward slope of the furnace walls for that part of the travel, in which the swelling of the ore and consequently the friction was thought to be most promi-

Hearth Diameters of 20 Ft.

With the removal of these assumed limitations of hearth dimensions the situation has changed. Hearth

^{*}Superintendent blast furnaces, Illinois Steel Co., South Chicago, Ill.

diameters of 20 ft. and larger are in satisfactory operation and the opportunity is now here to increase the bosh diameter over the rather commonly accepted 22 ft. standard without sacrificing anything in suitability of bosh angle or height.

The result to be expected from such designs should, of course, be a freer working of the furnace, that is, regular descent of the charges and, other conditions

being equal, a lower blast pressure.

Practical results appear to verify this theoretical analysis since, for instance, No. 6 blast furnace at the South Works, of the Illinois Steel Co., which was designed along such lines of reasoning and has now been in operation for about two years, has consistently worked with a more regular and uniformly lower blast pressure than the other furnaces at this plant under comparative conditions. The principal dimensions of this furnace are given in Fig. 1. [The paper gives tables of the performance of the furnace as well as of the average results of all other South Chicago furnaces.]

Although the number of large furnace hearths installed throughout the country has increased by leaps and bounds during recent years, some furnacemen are still maintaining a skeptical attitude and are occasionally voicing their objections with more or less substan-

tial arguments.

Large Hearths and Lack of Penetration

One of the most frequently heard assertions is that the large hearth furnaces must necessarily suffer from lack of penetration, and that this ailment can be alleviated only by either considerably overblowing or by reducing the tuyere size to such small dimensions as to

create a pronounced "jetting" action.

Advocates of this theory are laboring under a wrong assumption with regard to the actual pressure drop through the tuyeres of a blast furnace. Calculations based on authoritative tests concerning the flow of air through orifices show that under average conditions of Mesaba practice this pressure drop is less than 10 per cent of the total blast pressure and this figure has been repeatedly verified by taking pressure readings on furnaces in operation. Since it is also a scientific fact that the energy of the air flow through an orifice, that is, its ability to overcome resistance or to penetrate, varies directly as the difference in pressure before and after the orifice, it will be readily seen that, other things being equal, a doubling of the penetrating ability would require only a small increase in total blast pressure. However, practice on our largest hearth furnace in South Chicago has conclusively demonstrated that no such additional penefrating energy is required.

Based on an equal volume of wind blown, it was found best to use a slightly larger tuyere area than on other furnaces with smaller hearths. The only possible explanation for this seems to be that the materials are not packed as tightly in the large hearth and actually offer less resistance to the blast. The latter, therefore, with the same energy, is able to penetrate for a greater radial distance than was formerly pos-

sible.

Length of the Tuyeres

Another contention is the fact that on many large hearth furnaces the tuyeres, extending from 9 to 12 in into the furnace proper, are longer than those in use at other plants. The assertion has even been made that the "jetting" action, as discussed before, together with the long tuyeres, produces "phantom" boshes, the actual working lines of the furnace having a much flatter bosh angle and smaller hearth than those provided in the design.

I feel justified on the basis of our experience at South Chicago, to say that we are able to use longer tuyeres to good advantage, and do so on furnaces with hearth diameters ranging from 17 ft. 8 in. to 20 ft. 9 in. on account of our steep and low boshes. Without these, shorter tuyeres would have to be used in an attempt to keep the bosh clean and prevent the formation of accumulations, the periodical building up and sliding off

of which was formerly a source of continuous trouble at a good many plants.

Increased Number of Tuyeres

It has also been asserted that, with an increase in hearth diameter, it would be necessary to add to the number of tuyeres in order to avoid too great a distance between the same, since this would lead to the formation of pilasters of inactive material and an undesirable reduction of hearth area. In reply to this I can only state that on four of our furnaces at South Chicago, where the distance between the centers of adjoining tuyeres, measured on the periphery of the

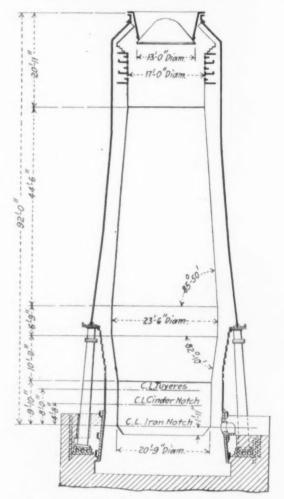


Fig. 1.—Dimensions of No. 6 Blast Furnace of the Illinois Steel Co. at the South Works

hearth was 4 ft. 7% in., 4 ft. 11% in., 5 ft. 9% in. and 5 ft. 10% in., inspection after blowing out did not show any such formations. On our No. 6 furnace, where with 20 ft. 9 in. hearth diameter and 10 tuyeres the distance between tuyeres amounts to 6 ft. 6% in., we do not expect to have an opportunity for inspection for some time to come. The operation of this furnace does not reveal any indications of forming such accumulations between tuyeres.

Summation of Advantages of Large Hearths

In summing up these arguments I do not intend to deny that conditions may exist in this country—and they are well known to predominate abroad—where in normal operation furnaces with high or flat boshes and small hearth dimensions work entirely satisfactorily and compare well in results with those accomplished in Mesaba practice by furnaces with larger hearths. The fact remains, however, that in a great number of instances, and under different conditions of raw materials, practice and products, the larger hearth has been the means of obtaining improvements in output and economy which were not realized before. So far I am not aware of any proven case where large hearths failed to produce results which could be obtained with smaller

diameters. The large hearth may therefore rightfully

continue to claim its supremacy.

Concerning the constructive features involved in the design of large furnace hearths it may be said that few departures have been made so far from former standards such as for years had given satisfactory service at our works.

On the contrary, it should be emphasized that the enlargement has not imposed additional or increased stresses and duties, while in some respects the demands upon the strength and wearing qualities of the construction have actually lessened. The volume for storing the molten iron and slag being larger, the maximum height to which these latter will rise above the low level prevailing at the end of the cast, must for a given production necessarily be lower. Thus, less pressure is exerted per square foot of bottom and hearth walls, and there is less danger of metal reaching the level of the cinder notch or of slag interfering with the combus-tion of coke at the tuyere level.

Such advantages are distinctly to the credit of the large hearth, as they could not have been obtained by increasing the vertical distances between the iron and cinder notches and the tuyere level. These dimensions

must necessarily be kept below a well defined maximum, otherwise the metal bath being removed too far from the zone of highest temperature, becomes the cause of producing physically cold iron, which is the source of many evils and worries in steel works as well as blast furnace practice.

The author then deals with plans to minimize the danger of iron break-outs, to reduce the chances of interruption of the water-cooling of the hearth jacket segments, and other plans, all of them illustrated.]

In conclusion, I take pleasure in pointing out that the successful development of the large hearth blast furnace, unhampered as far as I am aware, by any sacrifice of former advantages, is an exclusively American accomplishment, which to-day is evoking the keenest interest of our competitors abroad. The results obtained so far justify the belief that permanent progress has been achieved to the lasting benefit of the American iron and steel industry.

There were two written discussions of this paper presented; one by R. W. H. Atcherson, superintendent blast furnaces, Inland Steel Co., Indiana Harbor, Ind., and one by W. H. Geesman, superintendent blast furnaces, Lackawanna Steel Co., Buffalo, N. Y.

A Review of the Development of Copper Steel

A Bibliography of the Subject-The Use of the Product in Steel Freight Cars

BY D. M. BUCK*-

ONE prominent investigator has roughly estimated that the annual charge due to corrosion of iron and steel is between 60 and 80 million dollars, based upon normal values of semi-finished products, and this figure takes into account only the actual value of the iron and steel itself without reference to other closely related losses, such as fabrication and installation costs, and the value of metallic paint, and other protective coatings, which unfortunately are not permanent, and which would become unnecessary should we ever reach the goal of all students of corrosion problems, the production of an absolutely incorrodible steel or iron, at a price sufficiently low to admit of its commercial use.

Although this aim has not yet been attained, tre-mendous strides forward have been made in the past The problem has been attacked from several 15 years. different angles, but I believe the results of careful investigation justify the statement that, in the light of our present knowledge, considering the average materials of construction, the best results are obtained by alloying with normal open-hearth or Bessemer steel, from 0.15 to 0.30 per cent of pure copper. The commercial application of this discovery was first announced by the company, which the author represents, in 1911, and that year it was placed on the market in sheet form.

It is not the intention of this paper to enter into a technical discussion of the various theories of corrosion which have been discussed more or less vigorously by their several adherents during the past 15 years, before sundry societies and in the public print, but rather to present to you in a brief form the more important evidence which proves the remarkable influence of copper additions to steel and iron, in checking the attack of atmospheric moisture and oxygen, and to heartily urge the more general adoption of copper steel in other sections than sheet metal, to which uses it has largely been confined up to the present time.

[The author includes a discussion of the literature on the effect of copper from the corrosion standpoint

and also a bibliography.]

It is perhaps unnecessary to further multiply these references to data confirmatory of the author's findings on copper steel, and this phase of the subject will be concluded by a brief allusion to the results of the official test of Committee A-5 on Corrosion, American Society for Testing Materials. This exposure test has been conducted by the corrosion committee of the society with the co-operation of the United States Bureau of Standards, Washington, the test sheds being located at three different places, all on United States Government property, representing the atmosphere of an inland industrial center, the Atlantic sea coast, and an inland rural section. Bare unprotected corrugated sheets of 22 gage and 16 gage were exposed during the winter of 1916-1917, the following types having been included in the test:

Low-copper (normal) open-hearth steel.
Low-copper (normal) Bessemer steel.
Basic open-hearth copper steel.
Acid open-hearth copper steel.
Bessemer copper steel.
Low-copper pure iron.
Copper bearing pure iron.
Low-copper wrought iron.
Copper bearing wrought iron.

In addition to these types sundry manufacturers were invited to submit branded materials which they recommended for corrosion resistance. A representative inspection committee has made annual reports to the society on the condition of the tests, and although conclusions have not as yet been drawn by the committee, the 1920 report yields enlightening information. inland industrial location, out of 146 sheets of 22 gage copper bearing materials, (0.15 per cent copper or over) 41 sheets or about 28 per cent had failed after 41 months exposure, while out of 84 non-copper bearing sheets (less than 0.15 per cent copper), 67 or about 80 per cent had failed after 22 months' exposure, and 81 or 96.66 per cent had failed at 41 months exposure. Furthermore, the three sheets of this class which had not failed contained 0.133 copper, and fall into the non-copper bearing class due to the arbitrary division point of 0.15 per cent, which was selected by the committee. Out of 132 No. 16 gage copper bearing sheets, none had failed after 41 months exposure, while out of 126 non-copper bearing of the same gage, 33 or about 26 per cent had failed. Moreover, no groups (22 gage) remained intact after 41 months except copper steels, and nearly 88 per cent of all copper steel sheets were still intact.

At the inland rural location, the 1920 report shows that failures have started to occur and that "it is interesting to note that the group of sheets which failed first at this point are the same as those which failed first at Pittsburgh" (Industrial location) that is, the non-copper bearing steels.

With this overwhelming mass of evidence, we may

^{*}Metallurgical Engineer, American Sheet & Tin Plate Co., Pittsburgh.

consider it as proven that by alloying with normal openhearth or Bessemer steel a small copper content (0.15 to 0.25 per cent) the corrosion rate is enormously reduced wherever the products are exposed to alternate attacks of air and moisture, which conditions prevail in practically all characters of atmosphere. It is certainly very conservative to estimate that the life of sheet metal is doubled by this treatment. Indeed a careful analysis of the author's results as well as of the other data submitted indicates that the increased life of unprotected metal is probably more nearly 300 to 500 per cent.

While it is undoubtedly true that the greater portion of steel and iron products exposed to corrosive conditions is, at least initially, covered by some protective coating, it is equally a fact that these protective coatings are unfortunately only transitory protection, and wherever unprotected metal is exposed, or after the paint or metallic protective film has worn away or become damaged, thus exposing the bare iron or steel, such additional life as can certainly be obtained by the simple alloying with copper becomes of paramount importance and of almost incalculable value.

It may not be out of place here to state that in addition to the added resistance of copper steel to corrosion, the author has noticed in his investigations indications which point to a better adherence of paint coatings on copper steel, thus resulting in a more perfect and longer continued protection by the paint film.

The benefits to be obtained by adding copper to normal steel, to be fabricated into materials of construc-

tion, cannot be successfully contradicted. The melting point of copper is approximately 700 deg. Fahr. lower than the average tapping temperature, it diffuses readily, and once diffused does not segregate.

The manufacture of copper steel has heretofore been largely confined to sheet metal, and the product has been tremendously improved. The usefulness of this discovery may readily be broadened by the use of copper in other steel and iron sections, and their life thereby greatly increased. To mention a single example, steel freight cars, especially those of the open type, suffer greatly from corrosion. If the life of the thousands of such cars that have passed out of the field of usefulness during the past few years could have been increased only 20 to 25 per cent, the result would have gone far toward relieving the severe car shortage which has recently existed. Such a result would probably have been attained had copper steel been used in their manufacture. We have here a comparatively inexpensive method of improving all of our products that are called upon to resist the attack of air and moisture. thus greatly increasing their period of service and at the same time effecting an immeasurably important sten in the conservation of our natural resources. The author's wish in presenting this paper is to respectfully urge your earnest consideration of these suggestions.

Those discussing this paper were Dr. J. S. Unger, director research department, Carnegie Steel Co., Pittsburgh; Prof. W. H. Walker, Massachusetts Institute of Technology, Boston, and Dr. Allerton Cushman, Washington, D. C.

The Heat Treatment of Automobile Steels

Calculation of Critical Temperatures Possible—Classification of Automobile Steels

BY R. R. ABBOTT*

S TEELS entering into motor car construction do not differ from those entering into the construction of any other piece of machinery. The use of alloy steels has developed coincidentally with the development of the automobile and, of necessity, the art of heat treating has been extended to keep pace with this development.

To the man who is familiar with what has been done during the last 15 years in the accumulation of knowledge of the manufacture and heat treatment of special steels, there are two facts which cannot fail to impress him very forcibly:

The manufacturers have produced comparatively few classes of alloy steels which apparently cannot be radically

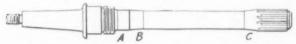


Fig. 1.—Where the Break Usually Comes in Automobile Axles

improved upon by varying the percentage of the constituent elements. No new alloy steels have been produced recently which are radically superior to the steels in use for the last

The metallurgists are spending immense sums of money in laboratory equipment and experimentation, trying to obtain the highest physical properties possible, out of these steels. In short, the manufacturing foundation is apparently more firmly established than that of the heat treating.

Let us see why this is so. The demand for heat treatment of steel has been developed so rapidly that the supply of men with the practical experience and the fundamental knowledge of the underlying theories necessary for this work, has not been available. The result has been that men, not fully equipped with this experience and knowledge, have been compelled to assume charge of metallurgical laboratories and heattreating operations and produce physical properties in steel demanded by the particular product made by their

employers. This has usually been an expensive operation because it entailed a great deal of experimental work which otherwise would not have been necessary.

The underlying principles of the heat treatment of steel are in general comparatively simple and easily understood. Their practical application is not so readily carried out. For example, we know that a piece of medium carbon steel has two critical points or temperatures at which certain physical changes take place which are important in its heat treatment. These critical temperatures are readily determined by simple laboratory methods, but after this our theory fails to inform us just what connection exists between these temperatures and the best quenching temperature to produce certain physical results.

Calculating Critical Temperatures

We know that the critical temperatures depend upon the chemical composition of the steel; some elements raise and others lower both, while still others have opposite effect upon each of them. So far, our theory gvies us no information regarding these effects but, with sufficient experimental data on hand, it is apparent that we should be able to calculate the position of these critical temperatures from the chemical composition of the steel. This has been done and there are several laboratories that get all their critical temperatures by calculation from the chemical analysis. This is a

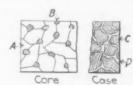


Fig. 2.—Core and Case of an Axle Driving Pinion for an Automobile

great step forward and it is of particular value to companies doing commercial heat treating where a great variety of steels is being treated.

Chemically, the steels in use at the present time in

^{*} Feerless Motor Car Co., Cleveland.

automobile construction can be broadly classified as follows:

- Nickel
- Chrome-nickel
- Chrome-vanadium
- 6. Manganese
- 7. Silicon
- 8. Molybdenum (chrome) (nickel)
- 9. Silicon-nickel

The first four are the common types; 5 and 6 are less common but are widely used for special work. Nos. 7 and 9 are more common abroad than in this country. No. 8 has only been used for a few years but the out-

look for its more extensive use is good.

There is no alloy steel which is markedly superior to all others. It is self-evident that if this were so, we should be using but one type of such steel. Each type has certain advantages and disadvantages. In order to obtain the maximum efficiency from a heat treatment, it is necessary to thoroughly understand the peculiarities of that type. There is no automobile made to-day which could not be made just as good if a different type of alloy steel, properly heat treated, were used in its The use of a particular type of alloy steel is largely a matter of personal preference which is usually backed up by a very decided conviction that this type is far superior to any other steel.

This conviction is usually the result of one of two causes: The user is more familiar with that type through personal experience of his own or of friends and, more or less extensive experiments have apparently convinced the user of the superiority of one steel. Frequently a part made of one type of steel does not give satisfaction in service and other steels are tried until one is found which is successful. In many cases the original steel would have proved satisfactory if the correct heat treatment had been applied. It is all too common a practice to compare the efficiency of different types of steel by applying the same heat treatment to all and judging the steels by the results. It would be just as logical to boil an egg and a potato three minutes and then condemn the potato as an article of food.

Faulty Heat Treatment, Not the Steel

I venture to say that in a large majority of the cases where one standard alloy steel has been con-demned and another substituted, it has been the fault of the treatment rather than the steel.

As a typical illustration of this, consider the heat treatment of light armor plate. Before and during the war light armor plate could be made which would resist the penetration of an armor piercing bullet at 50 and 100 yds. in a thickness of % in. Most of this armor plate was chrome-nickel steel. Much money was spent during the war in developing new steels in an endeavor to reduce this thickness. Plates were produced that would resist in 5/10 in. in thickness and two plates of very complex steels were finally produced as a result of thousands of heat treatment tests which resisted one shot only in a %-in. section. Just after the war a plate % in. thick, of a plain 3.50 per cent nickel steel, taken from the stock used in the manufacture of automobile axles, was forged to a thickness of % in., carefully heat treated; it resisted five shots fired at 50, 75, 100, 125 and 150 yds.

Apparently correct heat treatment of old steels than the development of new steels will frequently offer more promising results. It is less common for one type of alloy steel to be substituted for another due to defects in the manufacturing but there are occasional cases. In a recent case a high grade alloy steel, made by the electric furnace process, gave considerable trouble due to cracking during heat treatment. The steel makers insisted it was not the fault of the steel, and suggested a change in the treatment; this afforded no relief and the users finally decided to abandon that type of alloy steel and substitute another. At this point a sample was sent for examination to a metallargical laboratory and it was found to be full of slag. A new lot of steel was purchased and examined for slag before being used. None was found and the trouble disappeared.

Quite frequently a slight change in design will over-

come difficulties which are ascribed to heat treatment or material, or both. As an example, a common source of trouble in an automobile is the twisting off of live axles. In most cars they are subject to a bending moment as well as torsional. These usually break at A (or possibly B), Fig. 1. This is because the bending moment is a maximum at this point. The usual procedure, when this difficulty is met, is to try to get other steels which are better. If this fails, metal is usually added at A (or B). As a matter of fact if the design is otherwise correct and a good steel is used, the difficulty can usually be overcome by removing metal along the section B-C and throwing the maximum bending moment away from A (or B). Increasing the diameter of a fillet will frequently overcome trouble after much loss of money and time has been occasioned in the search of a better steel or a better method of treating the one in use.

Classification of Automobile Steels

Automobile steels subject to heat treatment can be

broadly classified into low, medium and high carbon.

Low Carbon Steels.—The low carbon steels are usually case hardened. The most important use is for gears, spring bolts, steering knuckle bolts, cam shafts and various other parts subject to wear. With the exception of the transmission it is nearly universal practice to use case-hardened gears for all purposes. A medium carbon transmission gear without case hardening is frequently used. Some gears, such as driving, differential and transmission are subject to much shock as well as wear, while others, as water pump, magneto and timing gears are merely subject to wear. A gear, or any case hardened part subject to shock, must be treated differently from one not so subjected.

Consider an axle driving pinion: After case hardening it consists of a low carbon core with a high carbon surface. If it is allowed to cool in the case hardening material it will have a structure similar to Fig. 2, which is magnified. The core consists of a matrix of soft iron, A, with fairly large masses of pearlite, B, which are mechanical mixtures of carbide of iron and iron containing all the carbon in the steel. The case contains large masses of pearlite, C, surrounded by an envelope of carbide of iron (cementite), D. A is soft and ductile. B and C are harder and less ductile, while D is extremely hard and brittle. If this pinion is now heated to the hardening point and quenched, the steel is hardened but the general structural appearance is the same as in Fig. 2. The actual change which takes place consists in the formation of a solid solution instead of a mechanical mixture in the pearlite B and C. The brittle cementite envelope, D, now surrounds the hard solid solution, C, in the case and if a sudden shock occurs, this cementite will crack like glass; the rupture will be carried into the core where it acts like a nick in the surface of steel and the break will be carried right through the entire piece, unless the area of the core is large compared to that of the case. This treatment is not suited for parts sub-

If we now heat the same piece of steel progressively higher than the hardening temperature the pearlite B and C absorb or dissolve the surrounding iron, A, and cementite, D, until at some definite temperature we have a solid solution throughout the pinion, the only difference being that the solution made from the case is more saturated in carbon than that of the core. quenching, this condition is retained to a greater or lesser extent. This uniform structure is far better able to resist shock than the previous one but it has two disadvantages: The absence of the cementite, D, in the case lowers the resistance to wear and, the size of the solid solution crystals depends upon the temperature to which they have been heated and due to the high temperature used to obtain a uniform structure the large surface crystals show a decided tendency to brittleness. Both of these disadvantages can be removed by a second quench from just above the hardening temperature. By this heating, both the iron, A, of the core and the cementite, D, of the case are thrown out of solution, but by virtue of this method of formation, they are in a very fine state of division.

cementite, D, is now in very small globules, which no longer allow a shock fracture to travel any distance; the result is a wear-resisting case and a shock-resisting core and case.

It is very essential for the carrying out of this treatment that the temperatures at which the quenching takes place be controlled very accurately. In order to do so there has been developed and used extensively, an electric heating furnace having a low heat retention value; the parts to be hardened are placed in it with the fire end of a pyrometer couple as near the center as possible. Due to the low heat capacity of the furnace it is cooled considerably; as the articles heat, the pyrometer is read on a recording-chart and the curve shows a deflection the instant that the hardening temperature is reached, due to the absorption of heat caused by the physical transformation. By this means, inaccuracies in the pyrometer have no effect, since we are not concerned with actual temperatures but with the time at which a transformation is occurring.

A very common source of trouble, particularly in a case hardened gear is a rapid wear of the tooth surface. This is in spite of the fact that the gear is file hard when assembled. It can usually be traced to a too shallow depth of carbonization. The thin case acts similarly to a thin sheet of ice while the soft core can be likened to the underlying water. The rigidity of the thin case is not enough to resist the high unit pressure and as a result it sags and microscopic cracks develop in it. This allows minute pieces to chip out.

The result is an apparent rapid wear.

Medium Carbon Steel .- By medium carbon steels in the motor car industry is usually meant those containing from 0.25 to 0.55 per cent carbon. Such steels are used for nearly all important parts which are not case hardened. For parts which are subject to high stress such as springs, the higher range of carbon is used; for torsional parts, such as live axles, intermediate carbons and for parts subject to extremely high shock, such as steering knuckles and arms, the low carbons are used. Frequently but two divisions are made, spring steel and one containing 0.30 to 0.40 per cent The ideal treatment of this class of steel is that carbon. which will give a homogeneous solid solution with the smallest possible crystals. Usually this means a quench from slightly above the temperature of complete absorption of iron (the upper critical temperature). After the quench the steel is reheated (drawn) to various temperatures to give the physical properties desired. The higher the reheating temperature, the lower the physical strength and the greater the toughness. Frequently steels containing chromium require a preliminary heat considerably above the temperature of complete absorption.

Parts subject to great shock, such as steering arms and knuckles, are drawn back to a very high temperature to give maximum toughness, while those subject to a constant high stress, such as driving axles, are drawn to a comparatively low temperature. Front axles and connecting rods and various similar parts usually receive an intermediate draw. This general treatment, irrespective of the temperature of draw, produces a homogeneous material instead of the mechanical mixture of unheat-treated steel. The result is an increase in strength, toughness, fatigue and shock resisting properties.

It is unfortunate that there is no commercial testing machine which will give us accurate data regarding shock and fatigue tests of steel. We do know, however, that if we produce this homogeneous structure and have a high degree of toughness (as measured by the reduction in area) the steel will resist fatigue and shock to the highest degree. There is no one alloy steel type which resists fatigue or shock better than any

The very peculiar fact was discovered during the war that with some steels, particularly those containing chromium, higher shock tests could be obtained if the steel was quenched from the temperature of draw instead of allowing it to cool slowly. No difference in the other physical properties was found. In one instance many crank shafts, which met physical specifications in all ways except for shock test, were rejected. These were then drawn over and quenched from the low drawing temperature, when they passed a high shock test. They were no better physically than they were before and their record in service was neither better nor worse than those which passed the shock test without this quench. In another instance a tabulation of aeroplane motor crank shafts broken in service, contained more which had passed a high shock test than those which had passed a low test.

High Carbon Steel.—Very little high carbon steel is used in motor car construction. Plain carbon steel springs both flat and spiral are used with from 0.60 to 1.25 per cent carbon. Bearings with and without chrome and containing 1 to 1.25 per cent carbon are commonly used. Some hardened tool steel is used for

small pins.

The heat treatment of steel is becoming more and more an exact science. In the near future very little experimental work will be necessary in the metallurgical laboratory. From the chemical analysis the correct heat treatment as well as the physical properties resulting will be calculated. Also from our knowledge of the effect of different elements upon the physical properties, we shall determine mathematically the correct composition to produce required results.

High Manganese Iron in Basic Open-Hearth Practice

An Aid in Blast Furnace Operation-Greater Yield in Rolling - Elimination of Sulphur and Oxygen

BY E. A. WHEATON*-

THE purpose of this paper is to show one of the phases of the experimental activities of the Bethlehem Steel Co. in attempting to solve the sulphur problem; and the particular phase dealt with is the partial elimination of sulphur from high sulphur pig irons by the use of a manganiferous burden in the blast furnaces to produce pig iron for use in basic open-hearth furnaces which shall contain enough manganese considerably desulphurize the pig iron in the ladle, the mixer and the furnace bath. Some data will also be presented tending to show the deoxidization of the open-hearth bath contemporaneously with desulphurization.

Objections to High Manganese

The objectors to the utilization of high manganese in the initial open-hearth charge have usually substantiated their position on account of increased costs and the alleged reduction of open-hearth tonnage; or have relied upon the selection of high-grade raw materials and satisfactory low sulphur (open-hearth) fuel to facilitate the production of the relatively small tonnages of high quality product; but the necessity of paying attention to the manganese consideration, or some other desulphurization method, will sooner or later be forced by the increasing difficulty of locating sufficient quantities of high grade materials and fuels and by the increasing cost of the same.

While the amount of sulphur contained in steel has been the subject of extended investigations, and while many different opinions are held as to the ultimate effect of different sulphur contents on various grades of steel, it is the generally accepted fact that within reasonable limits the main effect of sulphur is to react against the operation of the rolling mill or of the finishing department rather than to affect the serviceability of the

^{*}Superintendent, open-hearth department, Bethlehem Steel Co., Bethlehem, Pa.

steel once it has passed a reasonable inspection; and this penalty steel manufacturers have been prone to accept as unavoidable rather than to exhaust other resources such as the utilization of manganese in the initial open-hearth charge for the elimination of their manufacturing difficulties.

Records show a consistent increase in the sulphur content of coking coal and gas producer coal to such an extent that it has been a constantly increasing effort on the part of the steel manufacturer to meet present sul-

phur requirements and specifications.

In the face of increased difficulties in obtaining high grade raw materials and in the effort to produce the highest quality of products requiring special inspection and for special service, and believing that certainly some of the difficulties might be overcome by the use of a high manganese pig iron, the Bethlehem plant of the Bethlehem Steel Co. undertook to operate its No. 3 open-hearth furnace for a considerable period in the manufacture of steels where the inspection and service was particularly severe and where the effect of any improvement of quality would be most readily demon-The data presented herewith extends over strated. several months' experience, but particularly refers to the month of August, 1920, as our records are kept in monthly periods and as the experiment is complete in itself in that period, inasmuch as nothing but high manganese pig iron was used at that time. data the following conclusions are derived:

That high manganese iron is a help rather than a hindrance in blast furnace practice.

That high manganese iron improves the quality of openhearth steel without reduction of tonnage or practice or other injurious effects.

That to meet the demands for the better grades of steels, alloy, etc., it is of very great assistance.

That, due to better surface conditions, steel made from it shows increased yields with ordinary rolling mill practice.

Blast Furnace Operation

With high sulphur coke and inferior raw materials, a blast furnace must resort to a very limey slag or increased slag volume in order to insure low sulphur steelmaking iron. Either means low tonnage in blast furnace and high coke ratio. If the manganese in the hot metal is kept around 2 per cent, it is possible for the blast furnace operator to run his iron higher in sulphur with leaner slags, increased tonnage and reduced fuel ratio; and at the same time deliver to the open-hearth iron as low in sulphur as could be obtained with low manganese iron cast much lower in sulphur. This is borne out by the following figures of 136 tests run on high manganese irons between blast furnaces and open hearth No. 3 at Bethlehem, to determine the desulphurization in the pig iron transfer ladle.

The methods used were as follows: C blast furnace

was run on high manganese iron with lean slags, and of course high sulphur. A sample of this metal was taken from each ladle at the blast furnace and from the same ladle at the open-hearth mixer. The average time between sampling at the blast furnace and the mixer was 80 min., which is about the average time consumed in normal operation; 136 ladles of iron were thus tested. These ladles contained varied percentages of manganese and sulphur which I have divided into

three groups, according to manganese content:

First group, iron from 1.00 to 1.50 per cent manganese Second group, iron from 1.50 to 2.00 per cent manganese. Third group, iron from 2.00 per cent and above.

			and the same
	Sulphur at	St	ulphur at Open-
	Blast Furnace, Per Cent.	Manganese, Per Cent.	Hearth Mixer, Per Cent.
Group 1.—Averag 21 Tests.	e, 0.0867	1.39	0.041
Group 2.—Averag	e0.070	1,72	0.035
Group 3.—Averag	e0.073	2.13	0.031

From the above it would seem, at first glance, that an average of 1.39 per cent manganese is as effective as higher manganese for desulphurization in the ladle. The pig iron sulphurs in the entire 21 heats of the first group were relatively high, thus affording better opportunity for reduction of sulphur than was afforded in a number of casts in the second and third groups. found, also, that with iron running less than 1.80 per cent manganese, it was necessary to hold longer in the ladle than with manganese over 1.80 per cent.

The general conclusions that I have drawn from the above data are that it is possible for the blast furnace man with high manganese iron to run lean slags, maintain tonnage, and with sulphur in blast furnace iron as high as 0.100 per cent to deliver that same iron to the open-hearth furnaces through a mixer, with 50 per cent of sulphur eliminated.

High Manganese Iron and the Open Hearth Furnace

The principal objections brought out against the use of high manganese iron are:

Decreased tonnage Decreased yield of ingots.

Scorification of furnace banks.

Scorification of ladle linings, causing decreased life of

The results of our experience at open hearth No. 3 at Bethlehem are as follows:

Tonnage .- During the month of August, 1920, we worked exclusively on high manganese iron. 50-ton furnaces and tapped 70-ton heats of ingots. Our average time of heats during this month was 10 hr. and 15 min. This includes all the alloy grades and is the best average time that was ever made in this shop. One of the reasons of this decrease in time of heats was the fact that a slag can be worked into shape quicker with high manganese iron than with low manganese.

Yield of Ingots .- Yields at open hearth No. 3 for the month of August, 1920, according to grades, are:

	3	Pe	r Cent
Basic carbon high manganese			89.77
Basic carbon ordinary			90.29
Basic carbon special			89.47
Basic carbon high silicon			90.45
Basic nickel			88.38
Basic chrome			
Basic nickel chrome			89.89
Basic chrome vanadium			91.64
Basic chrome molybdenum			90.22

This is better practice than we have averaged with low manganese iron.

Scorification of Furnace Bottoms .- I can find no explanation as to why high manganese iron should be harder on furnace bottoms than low manganese iron. In fact, our experience has been, if anything, the other way. During August we averaged 11 min. bottom delay per heat, which is lower than usual; MnO being a base should not affect a basic bottom.

Ladle Linings .- Our experience with ladle linings shows nothing detrimental in the use of high manganese iron. Our average for the month of August of 18 heats per ladle, compares favorably with ordinary prac-We used a 90-ton ladle for a 70-ton heat, giving a large volume of slag; with slow pouring through 11/2in. nozzles. Also, we box-pour, which necessitates hot steel and slag.

Effect of High Manganese Iron on Quality

While there is considerable conjecture as to the injurious effects of sulphur in the finished product, every one will agree that both sulphur and oxygen are the cause of considerable worry to those whose task it is to convert the ingot to the finished product. The effect of manganese on sulphur and oxygen is believed to be as follows:

Sulphur-Iron combines easily with sulphur, and in certain associations at certain temperatures is capable of taking it up from otherwise stable compounds. Among others, it decomposes sulphate of lime (CaSO.) according to the equation:

CaSO₄ + 4Fe = FeS + CaO + 3FeO

The iron sulphide goes into the metal. From this it is seen that even though we start with a low sulphur charge and are compelled to use high sulphur fuel, the sulphur may get into the bath.

Averages of many heats are as follows:

Iron with manganese 0.75 to 1.00 per cent, giving residual manganese of below 0.20, the finished sulphur in heat shows 0.046 per cent.

Iron with manganese 1.00 to 1.50 per cent giving 0.20 to 0.25 per cent residual manganese, the finished sulphur in heat shows 0.043 per cent.

Iron with manganese 1.50 to 2.00 per cent, giving 0.25 to 0.30 per cent residual manganese, the finished sulphur in heat 0.041 per cent.

Iron with manganese above 2.00 per cent giving above residual manganese, the finished sulphur in 0.30 per cent heat shows 0.038 per cent.

The sulphur in the charge was increased with the manganese in the iron rather than decreased:

Charge of 0.75 to 1.00 per cent manganese averaged 0.052 per cent sulphur.

Charge of 1.00 to 1.50 per cent manganese averaged 0.053 per cent sulphur.

Charge of 1.50 to 2.00 per cent manganese averaged 0.055 per cent sulphur.

Charge of above 2.00 per cent manganese averaged 0.061 Same fuel used on all heats. cent sulphur.

With the nickeliferous irons used for making nickel steel: A 0.0345 per cent sulphur iron containing 0.66 per cent manganese gave 0.0385 per cent sulphur in the steel

A 0.0395 per cent sulphur iron containing 2.35 per cent manganese gave 0.029 per cent sulphur in the steel.

Outside of the pig iron other elements were the same.

From the above results I have concluded that manganese introduced in the pig iron will reduce sulphur in the open hearth charge.

Oxygen.-Oxygen is contained in all classes of steel but only in very minute amounts. The estimation by analysis of the amount present in steel is accompanied by very great difficulties. In spite of the fact that the amount of oxygen going into the steel is in very small ratio to the total weight, we can daily observe that iron takes up oxygen and that large amounts of reducing agents are not capable of completely hindering its Carbon, phosphorus and silicon, for example, act imperfectly in a basic furnace to take up oxygen.

According to the best evidence the first indication of red-shortness in steel is noticeable with 0.01 per cent oxygen, while a content of 0.05 per cent oxygen renders steel unusable.

According to Dickman, red-shortness due to oxygen cannot be offset by carbon, phosphorus or silicon, but can be very much reduced by means of manganese, which, although it does not effect complete removal, must be regarded as the best destructive agent of the ferrous oxide dissolved in the iron. We can then use manganese as a preventive agent against red-shortness by means of additions to the charge. This is best accomplished by the use of high manganese iron.

Dickmar also claims, and this is borne out by our practice, that oxygen will not be found in steel in noteworthy quantities so long as the residual manganese remains sufficiently high or 0.30 per cent. The reason for this is that there takes place a state of equilibrium between the manganese in the slag and the metal and the more manganese contained in the metal the more quickly this equilibrium will be attained.

In acid steel manufacture a great deal has been said in the past few years about the impregnation of the bath with silicon from the slag and furnace bottom, and I think it has been generally agreed that an acid heat, to impregnate any large amount of silicon (say about 0.18 per cent) must be pretty free from oxides, The same may be said about reversal of manganese from slag to metal in a basic furnace; when this takes place the heat must be pretty well cleared up and the slag and metal must be nearly free from FeO.

Date	CaO	Mgo	SiOs	Mno	FeO	S	P20s
8/14	53.44	5.86	20.69	5.50	10.31	0.25	1.37
8/15	53.86	7.13	23.37	4.05	9.37	0.23	1.16
8/16	54.96	7.39	22,30	4.20	9.62	0.27	1.32
8/19	50.81	6.73	26.83	6.85	6.42	0.19	1.50
8/20	42.68	5.01	24.31	8.59	11.02	0.142	0.82
8/21	42.80	6.10	26.44	7.88	8.72	0.196	1.04
8/22	42.97	5.32	26.64	9.42	7.54	0.138	1.26
8/23	48.28	5.35	22.15	5.65	10.55	0.235	1.43
8/26	48.41	7.70	24.93	3.95	7.09	0.125	1.45
8/27	48.71	5.36	22.65	4.75	8.27	0.236	0.98

Typical slag analysis taken at one-half hour intervals during the working of heat:

Heat No. 52312	MnO	FeO
First test	10.06	19.95
Second test	12.64	11.09
Third test	9.68	9.46
Fourth test	9.93	9.20
Heat No. 53260		
First test	13.29	9.72
Second test	10.71	10.84
Third test	12.26	8.60
Fourth test	11.61	8.43

The advantage of having the manganese in the charge and not adding it preliminary to the tapping of the heat is best brought out in an article written by Mr. Kinney, which appeared in the transactions of the Institute of Mining and Metallurgical Engineers of April, 1919. Mr. Kinney asks the question, "Can one logically assume that the demand for thorough deoxidization be met when a bath of steel low in residual manganese, and covered with a basic slag containing the general percentages of oxides, be deoxidized by the most archaic method of adding a few hundred pounds of deoxidizer in the ladle and pouring the steel almost immediately? Also, is it possible for equilibrium to be attained in slag and metal and complete deoxidization when this manganese is put in the furnace just previous to tapping?

Upon the answer of these two questions depends the need of a high manganese charge for the manufacture of the better grades of basic open-hearth steel. Previous data shows that the loss of manganese from additions made at tapping is very greatly reduced as the residual manganese of the heat increases. During the past month steel has been made at open hearth No. 3 with an average residual manganese of 0.38 per cent, adding 0.13 per cent and finishing 0.48 per cent, or a loss of 0.03 points. This shows clean steel.

Advantages in Rolling Mill Operations

I have not tabulated actual figures on the chipping costs, yields, etc., of steel made from high manganese iron in comparison with low manganese. However, I have observed that steel made from high manganese iron shows less tearing at the bloomer, requiring about one-third less chipping; yielding, by my estimate, more than 3 per cent additional good product.

F. D. Carney, Carney & Lindemuth, New York, was to discuss this paper, but his contribution was read by title only.

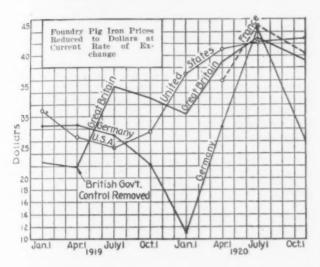
European Iron and Steel Two Years After War

Highly Important Question of Exchange—Comparative Prices of Iron and Steel Products in the Great Producing Countries

IN his paper on European Iron and Steel Two Years After the War, H. Cole Estep, European manager Iron Trade Review, discussed prices, saying in part:

"American pig iron prices are at present the highest in the world. Our steelmaking pig iron is about \$8 a ton more than that of our nearest European competitor, Belgium, and \$9 a ton more than British basic iron. The range between our northern foundry irons and European foundry pig is about the same; in the case of southern foundry iron we are in a somewhat more favorable position, but even in the case of this relatively low-priced metal our prices are considerably higher than those of France, Great Britain and Belgium, and of course much higher than those of Germany.

Turning now to steel prices, we find a more satisfactory state of affairs. Our current quotations on billets, for instance, are about \$6 a ton under the French price and \$15 a ton under the British price. Our billets, however, are slightly higher than those of Belgium—and this by the way is simply another index of the wonderful recovery made by that little country.



"On ship plates, our prices for the time being are about \$11.50 a ton under the British market, \$16.50 a ton under Belgium, and \$62 under France, where special conditions obtain. Only German plates are lower than ours, yet Germany recently is understood to have placed large shape plate orders with American selling agencies. Conditions, although slowly righting themselves, are still topsy turvy, and prices therefore do not exert their normal influence on market movements.

"The relative international situation in the prices of steel bars, which have not been charted, is about the same as obtains in the case of billets and places. Current transatlantic freights on heavy iron and steel products range from \$10 to \$20 a ton, and in most cases this places even our more favorable prices on a competitive basis, while adding further to the handicap under which our pig iron is laboring.

"Our best chance at the moment appears to be to export billets or plates to Great Britain. Fortunately these are commodities which the United Kingdom stands in need of, and a study of export statistics shows that considerable trade of this character is moving.

Our High and Mighty Dollar

"So far as competing in Europe is concerned, most of our price troubles at the present time are founded not on manufacturing conditions, but on a factor almost entirely beyond the control of the iron and steel producers-namely, the rate of exchange. The foreign value of our money is, so high that we are penalized anywhere from 25 to 75 per cent or more on all transactions in Europe. Take a mild case, Great Britain, for instance. In the case of pig iron, the higher price of the American product is due entirely to the exchange position; turning to billets and plates, if exchange were normal, our quotations would be around half of those asked by English mills and our competitive position correspondingly strengthened. The almighty dollar is anything but a help at present to our iron and steel exporters.

"The effect of the rate of exchange is even more vividly demonstrated in the case of Germany. Reduced to a dollar basis our prices are about double those of Germany at the present time, but on the basis of the pre-war value of marks, German prices are at least six times higher than our own. German foundry pig iron is 1659 marks per ton; at normal rate of exchange this is \$332! But by virtue of this same exchange

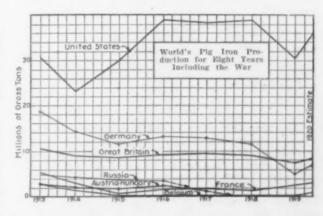
factor, to meet German competition purely on a price basis we should have to scale our own foundry pig iron down to \$26.30 a ton at the present time, to say nothing of transportation charges. Yet American steel is moving into Holland, within a stone's throw of Germany's greatest steelworks. This is due partly to the fact that the German long since has stopped giving the foreign buyer the full benefit of the rate of exchange, applying an additional charge which he picturesquely calls die Valuta. But more important still, Germany hasn't the steel to deliver.

"The position of exchange is in fact the dominating consideration in European iron and steel prices, and not until exchanges are righted, or at least stabilized, can the American exporter feel he is on safe ground.

When World Prices Meet

"Widely fluctuating as international prices have been during the past two years, nevertheless twice since the end of the war the quotations in all of the principal countries nearly have coincided. This occurred first in May and June, 1919, and again in July of this year. In order to bring this fact out clearly, the chart has been prepared, showing graphically foundry pig iron prices. Other pig iron and also the steel prices exhibit the same phenomenon, but the illustration is most vivid in the case of foundry pig iron. The coincidence in these prices in July of this year is particularly striking, the German, British, French and American figures all being in the neighborhood of \$43 for a time; the coincidence in May and June, 1919, soon after the removal of British government control, is only less striking, prices at that time coming together in the neighborhood of \$27 a ton. Following each of these conjunctions, the quotations, acting under the influence of movements in the rate of exchange and local market conditions have shown a wide divergence. Belgian pig iron prices, it might be added, have followed a path of their own, owing to the abnormal rise in Belgian exchange earlier this year and to other factors.

"Generally speaking, the price swings shown in the chart indicate that the period between the times of greatest conjunction and divergence is from six to eight months. These pendulum-like movements show the efforts the world's markets are making under the action of natural economic laws to re-establish their equilibrium. As time goes on, the swings can be expected to become less violent. If any deduction can be made from a study of these post-war international iron and steel price phenomena, it is that if the governments of



the world can only be persuaded to stop tinkering with the movements of commerce, currencies, exchange, and other fundamental factors, commodity prices can be depended on to find their own levels at about the same range of values in the principal producing countries."

Mr. Estep also spoke at length of the world's production of iron and steel, the wage situation and labor conditions. He said that "America's true destiny in the exporting of iron and steel will not be fully realized

until international trade as a whole approaches more closely to normal. The iron and steel future of the United States in the export field waits on the rehabilitation of Europe, not excepting Russia, and on the full re-establishment of Europe's own iron and steel 'production."

The Basic Open-Hearth Process—I

Development and Present Status of Various Fuels

—Efficiency of the Various Parts and Their Uses

BY F. L. TOY*

THE basic open-hearth process has been such an extremely important factor in the development of our great steel industry and has contributed so largely to our economic welfare that it is indeed difficult to outline briefly all its great advantages. It has made available to us the great natural resources of iron ore and produces, economically and at a low relative cost, a wide range of commercial steels suitable for practically every application for which steel is used.

The extreme flexibility possible through the various methods devised for its application as a process allows for the production of steels from a great variety of charges and by many variations in method of manipulation, so as to make possible the working of the process economically with regard to the supply of scrap and pig iron and the quality of the same, physically and

chemically.

The fact most important in considering its tremendous growth as a process is that it has permitted the use of iron of any phosphorus content, thus making available immense deposits of ore which could not otherwise be utilized. It is almost impossible to estimate the possible state of our steel industry at the present time had the basic process, as carried out in the Bessemer converter and particularly in the open-hearth furnace, not been such tremendous factors. Had their influence been lacking, then it takes no stretch of imagination to conceive a quite different status as to phosphorus specifications on finished steels as compared to present ones, for reasons both of volume of production and of the phosphorus content.

It should be borne in mind in considering the growth of basic open-hearth furnace production and of the total production of open-hearth steel, that the basic open-hearth process has made possible for the acid open-hearth process a far cheaper product and a greater application to quality production by furnishing it a

cheap and low phosphorus scrap.

Since all applications and all phases of the modern development of this basic open-hearth process cannot be adequately covered or satisfactorily expressed in a paper of the size here given, I will endeavor briefly to trace the development of the process, state some necessary lines of improvement as to efficiency, give some reasons for the present variations in the application of the process to steel making, and touch a little on the present "trend of the times" in regulating charge and method to the ends sought:

Historical

The year 1890 gives us the first reliable survey of the new and growing process in the United States, and in addition to the Homestead Works there is shown to have been the following plants producing steel by the basic open-hearth process:

The Steelton Works of the Pennsylvania Steel Co., using a combination of the acid-Bessemer and basic

open-hearth processes.

The Henderson Steel & Mfg. Co., Birmingham, Ala. The Southern Iron Co., Chattanooga, Tenn.

The Pottstown Iron Co., Pottstown, Pa.

Mr. Swank estimated the production by the process in the United States, including that made by the duplex process, for the year 1890 at 90,000 tons out of a total for all open-hearth steel of 513,232 tons. This total production was the output of 47 plants in 10 states. The

 Superintendent, onen-hearth department, Homestead Works, Carnegie Steel Co., Munhall, Pa. tremendous growth of the process and proof of its predominant influence is seen in the great steel output of to-day.

[The paper contains a section on the development of furnace lines together with 15 illustrations.]

The Development of Fuels

The fuels suitable for use in the open-hearth furnace have been, from the day William Siemens gasified coal in order to successfully operate his regenerative furnace in melting steel, necessarily those which had a high speed of combustion, giving high flame temperatures with a comparatively low ignition temperature. With the methods employed so far in burning fuels, high radiation effect has been thought desirable.

Producer gas has been throughout the development of the open-hearth process, acid and basic, the mainstay, and furnace development as to size and output has been paralleled and assisted by development in capacity and efficiency of the gas producer. The present trend is to fewer and larger units per furnace, as for example, a 100-ton furnace can be satisfactorily taken care of by two large producers, each with a capacity of gasifying

60,000 lb. of coal per day.

Mechanical feeding, poking, ash handling, careful crushing and screening of coal, careful regulation of blowing have helped to decrease costs of operation. The advantages of the producer are its simplicity and fairly low cost, its limitations are due to the high non-combustible content of the gas with the corresponding low calorific power and the objectionable clogging content of soot and tar. The necessary preheating of gas to obtain adequate flame temperature makes for larger generative systems and more complicated and costly furnaces. The proportion of total fuel gas generated in the producer in the future depends altogether on the growth of the by-product coke industry.

There has started a growing replacement of producer gas by coke-oven gas with varying amounts of tar. Plants isolated with respect to by-product coke plants must continue the use of producers indefinitely, and for them the problem of low calorific power, high sulphur, high ash coals must be worked out thoroughly. This will probably mean washing, entailing in general fine crushing, so that ultimately the use of very fine coal must be carried out successfully in the gas pro-

ducer.

Coke-Oven Gas

By-product coke-oven gas has developed as a fuel for the open-hearth furnace in the United States within the last five years. Considerable work has been done with it in Europe, particularly through mixtures of blast furnace and producer gas with it. As commonly used it is debenzolated, so that it is somewhat less luminous than the raw gas with from 5 to 8 per cent less of heating value. Having a calorific value of half that of natural gas, it possesses, nevertheless, at least three times that of producer gas, is much cleaner and has a very low content of inert gases. Like natural gas it cannot be preheated without breaking up and possesses similar advantages over producer gas in the elimination of costly gas making and handling equipment at the open-hearth plant, making more simple the port, uptake and cinder-pocket construction, and making possible greater volume for regeneration of the air. It is in general thought necessary to use tar in amounts dictated by practice or amounts available, for the pur-

pose of giving luminosity to the gas flame. The usual procedure is to blow the tar as atomized by air or steam through the end walls of the furnace, immediately over a jet of coke-oven gas. The whole burner arrangement is cooled by a water jacket so as to be able to maintain the desired position and inclination of the burner.

For considerable periods during the last 18 months practically straight coke-oven gas has been burned at the No. 3 open-hearth plant of the Homestead Works. The greater cost of furnace repairs, although small, would warrant, however, a study of the situation with the object of shorter flames, better flame control and an earlier ignition. The Duquesne Works have also had a period of successful use in a producer gas type of furnace as compared to their producer gas practice. In both cases above the gas enters at right angles to the air volume. The problem of burning coke-oven gas seems to be in the early stages of solution and, promising as it looks at present as a fuel, there can be undoubtedly much greater efficiency in burning, with incidental attainment of higher flame temperatures with the flame placed and kept where it will give maximum effect.

Ultimately we must learn to burn it without the added luminosity of burning tar vapor which will require much education as to flame temperatures on a new standard of flame color, together with a better mixture of air and gas; also methods for obtaining earlier ignition and for direction of gas so as to give practically its full calorific effect along the bath and before the gas can rise to burn along the roof or at the outgoing ports or downtakes.

There is hardly a doubt but that the growing effort to obtain the maximum from coal and to conserve its by-products will make for an increasing use in the byproduct ovens rather than in the gas producer. Even should the demand for by-product gas by municipalities tend to the point where coke is produced in surplus, it must be borne in mind that blue gas produced from coke has a calorific value double that of producer gas, a low volume of inert gases, is stable and free from soot and tar and can be used as a coking fuel for by-product ovens and for furnaces where high radiation effect is not necessary and direct heating desirable.

Tar and Fuel Oil

The quantity of tar produced in the by-product ovens bears a fairly close relation to the volume of gas produced, and the question of its overproduction in the growing scale of magnitude of by-product coke operations may arise. The excellence of tar as a fuel, not only in the open-hearth furnace, but also in heating furnaces and under boilers, makes the possibility of its overproduction remote. The present surplus over the needs of the tar refiners is used, as before stated, in combination with coke-oven gas or, as in several plants, is used alone as a fuel in a manner similar to that for fuel oil, employing air or steam, particularly the latter, to atomize the tar and convey it into the furnaces. The burners are usually placed in the end walls following the system used for oil. Great care must be taken to maintain sufficiently high temperatures by means of steam coils in storage tanks and supply lines, to avoid the deposition of pitch-like material which quickly clogs up the supply system. There are possibilities through better atomization and flame control by means of improved burner design, towards the attainment of very economical fuel consumptions as estimated on the B.t.u. per ton basis.

Fuel oil in its various stages from crude oil to residues dates in its use as open-hearth furnace fuel back to the introduction of the basic process into this country. It is a most convenient fuel, particularly for small plants. Its high flame temperature and easy control make it suitable for fine steels or work in foundries where high tapping temperatures are necessitated by numerous shutoffs in pouring and thin intricate castings. Of late the quality and amount of fuel oil passed over for fuel uses in metallurgical industries by the refiner and the high sulphur content of many of the oils has made the use of oil both expensive and troublesome.

It cannot rank as a major fuel and its supply is doubtful for steel-making.

Powdered Coal and Natural Gas

Powdered coal has been used in a number of openhearth plants continuously as a fuel for a number of years and has had extensive application for short periods in others where acute shortages of natural gas and lack of space for gas producers made the powdered coal fuel appear as the best relief. Powdered coal, even so fine as to pass almost entirely through a 300-mesh sieve, burns slowly as compared to gases. The extremely high velocities of injection into the furnace used in the past have prevented economical burning and have tended much towards the burning out of the brickwork on the outgoing ends.

Lower velocities of introduction, volume air systems, use of primary air, have given the fuel a much better chance to burn efficiently in the furnace. Preheating the air for combustion adds greatly to furnace efficiency and speed. Admitted that powdered coal burning is of late showing much more promise, the problem of the ash, which greatly complicates the regenerating system and interrupts the furnace operation, must be solved. Powdered coal systems must in the future take their share of high ash, high sulphur coals as must the gas producer. The cost of pulverized coal at the furnace is cheaper than that of producer gas for equal prices of coal. Steel has not been made with powdered coal fuel as cheaply as by average producer practice. Powdered coal is still in a stage of evolution, and gives promise of replacing gaseous fuels in many processes.

Natural gas, associated so prominently with the first stages of the basic open-hearth process in this country, is the finest fuel as yet obtainable for the purpose of steel-making. The next two years will no doubt find its use restricted to the domestic consumer, with a growing demand for coke-oven gas by the cities and towns.

General Efficiency of Furnaces

We can speak with pride of the place the openhearth furnace has taken in filling economic needs, but as a conserver of man power and of fuel and of its efficiency in general, and particularly from a scientific standpoint, we must speak apologetically, having seen so little of it manifested. There has been a sort of apathy towards improved labor-saving installations and a lack of desire for fuel-burning efficiency and heat conservation as regards the open-hearth process.

The blast furnace, already a much more efficient process, has been given a very much greater amount of constructive effort in this direction and the reward has been in the more ready solution of fuel and ore

problems as they continue to arise.

Heat Distribution

From reliable observations made in the very few plants where thermal efficiency was deemed of sufficient importance to warrant thorough investigations and a staff for that purpose, we can get an idea of the very large field for improvement and the economics possible. Very reliable investigations made at the Homestead Works show us the following: Of the total heat available in the open-hearth furnace, 14.16 per cent is in the steel at tapping, 3.3 per cent in the slag, 2.78 per cent is used in reduction of ore and calcination of limestone: 62.45 per cent leaves the outgoing port to enter the checker chambers, 22.93 per cent is absorbed by the checkers; 4.53 per cent is absorbed between the checkers and stack, and 34.99 per cent is carried up the stack. Radiation and conduction losses would total 17.31 per

The thermal efficiency of the regenerators, based on the ratio of the heat given up to the air and gas as against the total heat return to the regenerators, ranges

from 20 to 38 per cent.

The first consideration must be to get a greater return from the heat passed on to each unit of the furnace. The burning of the fuel so as to melt the charge more readily, to promote heat transfer to the steel and slag, and with complete combustion over the hearth, must be the first and the most important achievements.

In comparing and reviewing gas-burning systems that condition which stands out most is the fact that our ports are a compromise to suit both conditions of entry and exit, so that the tendency is almost universally to make the area of the ports too large for the incoming air and too small for the outgoing products; also, in producer gas furnaces, for gas velocity to greatly exceed the air velocity through its port, a condition bad for rapid combustion and high flame temperatures. Our flames are usually too long and start too

far from the entering port.

In furnaces of present design the mixing of air and gas depends on the inclination of the air to gas port, the extension of the air port beyond gas port to give the air access to the gas before entering the furnace chamber. It has been thought necessary to provide a heavy air blanket above the gas, so that the gas, being lighter than the air, would at least burn before it rose to a point where its combustion would damage the roof. Much better is a mixing of air and gas in the port so that combustion will start and finish while the flame still has direction along the top of the bath. The products can then rise and, expanding, fill the furnace chamber, giving their heat to bath and brickwork without damage to the latter. This, provided there is sufficient port area on the outgoing end.

Another condition, as yet hardly appreciated, shows flames approaching too closely the outgoing end and incomplete combustion. We have for years taken stack samples, found excess oxygen and no carbon monoxide and have concluded that combustion was completed in the hearth chamber. Careful sampling and analysis of gases from outgoing ports at several of the Carnegie Steel Co.'s plants lead to the conclusion that condition of incomplete combustion may exist at the outgoing port, whereas the stack sample may show complete combustion, due to the completion with excess air provided by leakage into the regenerator chambers, flues and valves. If we have had an excess of oxygen as so frequently stated it has been applied in the wrong place.

Direction of the Flame

The first step towards the efficient use of fuel is to give the flame direction, and this depends on the slope of the port roof, the size of the port opening and the velocities of the air and gas. The next step is to supply the necessary oxygen in such manner as to provide a thorough mixture and produce a short, hot flame. Air supplied under forced draft in combination with a system of contracting the incoming port area, while at the same time enlarging the outgoing port area and vice versa on reversal of flow, helps greatly in providing the above desirable conditions and would allow the admis-sion of air directly into the gas port as with natural gas burning.

The visible evidences of the embodiment of the above principles will be a shorter and hotter flame, quicker melting, more easy heating of slag and steel. less temperature variation in the bath at the ends from one reversal to another and finally a much longer life

of furnace brick work.

To those who fear that conditions which so help combustion may make for over-oxidation in producing fine steels it may be said that conditions of good flame control coupled with better combustion will make finally for more certain furnace control in obtaining either an oxidizing or reducing condition as desired.

The Regenerative Chambers

The blast furnace stove is from 50 to 100 per cent more efficient than the open-hearth regenerative cham-One of the reasons for the difference is the horizontal chamber of the open-hearth furnace as against the vertical type where the air rises naturally and gets full benefit of all the area. More volume is necessary for regeneration than is usually given, due to the cramped space usually allowed for the regenerators. By deepening the chambers and using a chamber more nearly vertical in action, double the number of chambers could be put on the same area of ground space, affording thus two extra chambers at each end for use in the system as the chambers in use clog up. placing vertical regenerators of much greater height

(or stove type) near the stack some of the efficiency and long service of the blast furnace stove could be obtained, and at the same time plenty of chance for deposition of dust in the flues.

Much of the hard drudgery of cleaning out and relaying regenerator brick can be saved by future planning and construction and at the same time a greater return of heat units from the furnace obtained with all the advantages of greater preheat in gaining fuel economy. The advantages of being able to put into service clean chambers as the ones in service choke up, irrespective of time of furnace repair, and those of having regenerative systems that are in good condition over many furnace runs are certainly worth trying for. Since regenerator brick are in general designed to withstand the frequent handling and relaying without breakage, being therefore thick, and being laid in a manner which usually sacrifices efficiency for a longer run because the more frequent the checker removals, the greater the delay showing on furnace repairs, then a development in regenerator design will open up to us to a greater extent the advantages of thin brick with their quicker heat transfer and absorption, and systems of laying more nearly adjusted to the laws of gases.

The amount of heat loss by radiation and conduction raises the question as to the means of adding to the thermal efficiency of open-hearth furnaces by reducing these losses. The use of thick walls and roofs is open to the objection of excessive melting action on the brick due to the greater amount of heat retained; to the increased accumulations that result; and there has been determined by practice in many cases a maximum thickness of brickwork, for which the radiation losses are balanced by the beneficial effects of cooling in preserving the brick. To suit such conditions there is necessity for development along the line of increased refractory quality in the brick, together with better insulating qualities in cutting down the amount of heat trans-

Portions of the furnace system not subject to the high temperatures adjacent to the hearth and ports, as, for example, the regenerative system and flues, may very well be made the subject of experiment as to the effect of better heat insulation, following the line of work being carried out in reference to blast furnace stoves. This would tend to further efficiency in the regenerators and add to the economy of the use of waste heat boilers.

Waste Heat Boilers

Since from 35 to 45 per cent of the total heat delivered to the furnace is wasted to the stack a recovery of 60 per cent or more by means of waste heat boilers is a paying investment. Their use is a well-developed feature of many plants and is particularly economical in the case of gas producer furnaces with their large volume of waste products. With natural or coke-oven gas as a fuel, not over 80 per cent as much steam can be generated as on the producer gas furnace. The fans in connection with boilers are materially beneficial in the latter part of furnace runs in promoting furnace draft.

Allowing for all of the improvements made in mechanical equipment for handling both charge and product, for all those made in furnace design and structures, we have still very serious problems in furnace effi-ciency and also in the application of improved furnace design and labor-saving methods to the problem of eliminating manual labor. The latter object must be obtained not only by making the final furnace repair less difficult but also by means taken to prevent "choking" up during the furnace run and to obtain less frequent repairs while maintaining furnace efficiency. To these problems the open-hearth man, the engineer and manager should give very serious attention, and all must realize that there is with them an ever-present obligation to solve these problems for the good of all.

(To be concluded)

The paper was discussed by W. A. Maxwell, Jr., assistant general superintendent Cambria Steel Johnstown, Pa., and S. J. Cort, superintendent openhearth department, Bethlehem Steel Co., South Bethlehem, Pa.

The Iron and Steel Industry in India

Enormous Mineral Resources—Developments of 90 Years, Including Large Scale Tata Operations

BY CHARLES PAGE PERIN*

INDIA possesses enormous deposits of iron ore of high iron content; large deposits of coal where seams occur in great thickness, with excellent roof and floor, and no serious mining difficulties so far, except that large quantities of water must be handled during the rainy season. The deposits of limestone are not within easy distance of the ore occurrences, but deposits of dolomite are known to be sufficient for present requirements. The deposits in Assam of limestone carry unlimited tonnage, as there are frequent breasts 4000 ft. high. There is ample manganese for the requirements of a very large steel industry. The firebricks made from the clays found in the Jherria coalfields are entirely satisfactory. The magnesite occurrences are not large and have the disadvantages of being rather too pure to frit. In Burma are the principal deposits of the world of wolframite, so that for the manufacture of alloy steel this valuable element is near at hand. In a country with such a dense population as exists in India there need be no shortage of labor.

Lord George Hamilton, former secretary of state for India, approached Jamsetji Nusservanji Tata, a distinguished Parsee of Bombay, who had made a great success of cotton spinning, and begged him to take up the manufacture of iron and steel in India, and to restore to India the renown which it had 2000 years ago as a producer of iron and steel. As a result of this interview Mr. Tata took up the subject actively, and in 1902 deputed the writer as consulting engineer to study the iron deposits in the Chanda districts in the central

provinces.

Later this work was extended over a distance of nearly 1000 miles east and west, and north and south of nearly 400 miles. C. M. Weld of New York was for three years in charge of this private geological survey. His work included not only the search for iron ores but studies in the coal fields, and a search for the other minerals necessary for the manufacture of iron. Many deposits of iron were discovered, and some of those long known to the public were found to contain insignificant tonnages. Our investigations were confined to peninsular India south of the valley of the Ganges, largely in regions not previously studied by the Geological Survey of India because of the fact that

they were in feudatory or native states.

In our first studies we did not find the forests of sufficient density to warrant the establishment of a charcoal furnace in the central provinces in the region in which Mr. Tata held concessions. We therefore extended our investigations toward the east, in order to approach more nearly the Bengal coal fields, which were then developed to the point of producing a large tonnage. Our studies of the iron ores at Chanda showed an ore largely magnetic, carrying 69 per cent of metallic iron and phosphorus 0.01. per cent. Our next important work was carried on in the central provinces, south of the Bengal Nagpur Railway, at a place called Dhullee-Rajara. Here Mr. Weld proved by diamond drilling the existence of one deposit containing 2,500,000 tons, and an adjoining deposit now assumed to contain 7,500,000 tons, making a total reserve in the Raipur district of 10,000,000 tons of iron ore, carrying 67 to 68 per cent metallic iron, with phosphorus 0.06 to 0.09 per cent. This particular ironbearing area is now known to have a very considerable extension to the south, carrying a tonnage variously estimated from 20 to 30 times that now reasonably accurately known. The eastward extension of our investigation led later to the taking of a lease from the Maharaja of Mourbhanj of three deposits occurring in his state. The first, that at Gurumahisani, on which the Tata project for the manufacture of iron and steel was based, was originally estimated to contain 7,500,000

tons of ore running from 60 to 63 per cent metal.ic iron and phosphorus 0.10 per cent. This deposit and the others found in the state are now estimated to contain 39,400,000 tons of non-titaniferous ores of 60 to 67 per cent of metallic iron.

After securing the lease of the iron ore at an average royalty over a period of 60 years of 2½ annas (5 cents) per ton, a site was found at Kalimati, now Tatanagar, for the blast furnace plant and steel works, on the line of the Bengal Nagpur Railway, near Sini Junction, and about 155 miles from Calcutta. Not the least difficult of our problems in choosing the site for our works was the question of an adequate supply of water both for the plant and the large population likely to grow up around it. This was secured at the junction of the Khorkai and Subernareka rivers.

The point selected was 100 miles, approximately, from the coal, 40 miles from the iron ore and 100 miles from deposits of dolomite. At the time of the presentation of the Tata project to the bankers, India's history in successful operation of the iron industry was

not replete with success.

Some Earlier Ventures

In 1830 a Mr. Heath had started in a modest way an iron works at Porto Novo on the Madras coast. For a number of years this plant was kept alive by government subsidy and the capital of Mr. Heath, until finally it failed in 1837.

In 1853 a new company was formed, the East India Iron Co., which ceased operations in 1874. This little

plant was dependent upon charcoal as fuel.

In 1875 the Barakar Iron Works was started near the Jherria coal fields, 143 miles northwest of Calcutta. The first efforts resulted in failure. They were restarted in 1881 and after a rather checkered career were finally reorganized into the Bengal Iron & Steel Co. in 1889. Until about 1906 this plant was dependent upon the iron ores contained in the ironstone shale, and it was not until after the discovery of the rich iron ores in the state of Mourbhanj by the Tata interest that the Bengal Iron & Steel Co. went further afield and discovered ore deposits some 70 miles west of those operated by the Tata Iron & Steel Co., a short distance from the station of Manharpur on the Bengal Nagpur Railway.

The Manharpur district has been reported on by competent English mining engineers, and three great deposits in the neighborhood of Buda Baru are estimated to contain more than 300,000,000 tons of high-grade hematite, running from 60 to 65 per cent metallic iron and phosphorus about 0.10 per cent. There are areas running up to 67 per cent metallic iron, but the percentage of phosphorus remains fairly uniform.

The Bengal Iron & Steel Co. now operates four blast furnaces, with a possible output of 80 tons per day each. They have Simon Carves by-product coke ovens for about half of their coke requirements; the remainder they purchase from the coke makers in the Jherria field. During the war one of their furnaces was devoted to the manufacture of ferromanganese.

At the time of my first visit to India in 1904 the Bengal Iron & Steel Co. had just closed down its steel plant, which consisted of two small basic openhearth furnaces and a blooming and structural mill. This plant failed and has not been operated since 1905. The company now operates a large foundry in which cast iron pot sleepers and chairs are manufactured and also cast iron pipes up to 12 in. in diameter.

Tata Iron & Steel Co. Formed in 1907

In 1907 the Tata Iron & Steel Co. was formed and commenced operation about five years later. Kennedy, Sahlin & Co. were constructing engineers and built the first plant, consisting of two blast furnaces, four 40-

^{*}Consulting engineer, New York; extracts, not full paper.

ton basic open-hearth, a combination rail and structural mill, and bar mills of 16-in. and 10-in. trains; 180 non-recovery retort ovens of the Coppé type were installed from motives of economy in first cost. The coke produced from these ovens, from coal dust of the Jherria field, carries from 17 to 20 per cent ash, and in England or America would be looked upon as a most undesirable blast furnace fuel, but with high-grade iron ore containing very little silica or alumina, the operation of the blast furnaces has been reasonably successful from the start. The tonnage of these two original stacks, built to produce 200 tons per day each, have been increased to an average of 375 tons each. The open-hearth furnaces have had their capacity enlarged to tap 58 tons each, and three new furnaces have been added of 75 tons capacity.

At the time of the starting of the Tata works our investigations of the imports into India showed a total tonnage of steel products of about 600,000 tons distributed over a very wide variety of products. It was decided first to supply only a portion of India's requirements of rails, structural shapes and bars. India's requirements of steel have so increased that the imports have grown in 15 years 100 per cent, despite the

local manufacture of steel and pig iron.

The operations of the Tata steel plant were fraught with all the difficulties which might be expected in starting a complex technical operation in a country where climatic conditions were distinctly adverse, and where there are no reserves of skilled operatives to call upon to take the place of men who for one reason or another were unable to continue working.

The rail specifications of the Government of India are extremely severe, but these difficulties were finally overcome. The government employed as its metallurgical inspector Dr. A. MacWilliam of Sheffield, who is well known to members of the Institute as a distinguished metallurgist, and his advice was most valuable in bringing the technical operations of the steel plant in line with the requirements of the Government of India.

In the early stages of operation the staff was composed of a few Americans in the blast furnace department, Englishmen in the rolling mills, and Germans in the open-hearth department. Adventurous spirits willing to go out into the jungle to start a new plant are not always those of best technical attainment, and the process of elimination went on very rapidly, but it was not, however, until the last of 1913 that the operations of making steel and rolling it might be termed successful. Since that date the pressure upon the directors for increased output has been very great, and the plant as now designed will ultimately reach an output of 1,000,000 tons of finished product annually.

Recent Iron and Steel Enterprises

Since the successful operation of the Tata steel works other enterprises have been formed, and there is now under construction by the Indian Iron & Steel Co. two modern blast furnaces. This corporation has secured its iron ores in the Singhbum district, just south of the deposits of the Bengal Iron & Steel Co. Various estimates have been made of the tonnage possessed by this company, but one single deposit, according to their reports, contains over 150,000,000 tons above drainage level of 65 per cent ore. This company will have to transport its ore over a line now under construction, a distance of about 200 miles to its furnace, which it is proposed to locate in the neighborhood of the coal deposits.

Two other iron and steel projects are in the formative stage, one in the hands of Villiers & Co., in which some of the English ironmasters are taking a substantial interest. This company proposes to build two blast furnaces not far from Calcutta, in the region of newly discovered coal and iron ore. Here again are to be found single deposits carrying tonnages of iron ore which will seem astounding to those members of the Institute who have been obliged to count with great accuracy their future reserves of iron ore.

The last new venture is in the hands of gentlemen who control a large area of coking coal, and they have secured iron ore deposits variously assumed to contain between 200,000,000 and 300,000,000 tons. I know that these figures will stagger members of the Institute and give the impression of being what Professor Shaler called "broad generalizations upon an insufficient hypothesis." This, however, is not the case, and since the beginning of the war prospecting parties have been continuously in the field working in a quadrangle 400 miles east and west by 200 miles north and south, beginning at Calcutta as the northeast corner.

About 20,000 Million Tons of Iron Ore

After investigations by some twenty prospectors, engineers of experience, and geologists connected with the different companies who have made these investigations, there is now estimated to be about 20,000,000,000 tons of high-grade ore within a maximum distance of the fuel of 500 miles, and an average distance of 120 to 130. During the war the Tata company added to its reserves of ore a very large tonnage, anticipating a great ultimate increase in the tonnage of pig iron to be produced.

For metallurgical coke India will be dependent on the group of fields lying in the Damudar valley and including Raniganj and Jherria; and, although the total amount of coal that they contain is undoubtedly very large, the quantity available for coke manufacture is strictly limited. We are not justified at present in placing this at more than 2,000,000,000 tons, and, when it is realized that the Indian iron and steel industry may depend on these reserves for its future existence, the necessity for their conservation becomes evident.

Scale of the Tata Company's Operations

The Tata Iron & Steel Co. has been presided over by a board of directors composed entirely of Indian gentlemen and the capital invested, which will soon reach \$70,000,000, is wholly Indian money, raised largely in Bombay itself. The gentlemen who have directed this corporation have been extremely liberal in their treatment of their employees, and their desire has been to develop India on broad lines. Much of the new plant which is now being built is intended to supply semifinished material to industries which it is expected will grow up around the central plant.

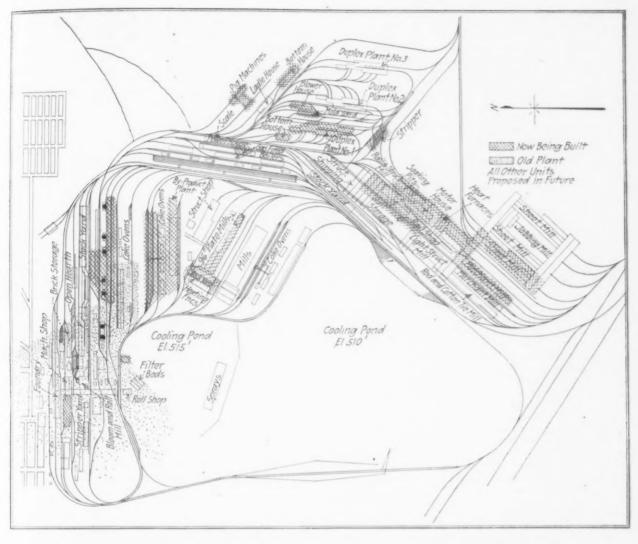
For example, the Burma Oil Co. requires for oil containers some 50,000 tons of tin plate per annum. It proposes now to manufacture a portion of this tonage in India, buying from the Tata Iron & Steel Co. tin plate bar, and for this purpose the Tinplate Co. of India, Ltd., has been founded. Tube makers expect to establish a plant at Jamshedpur for the manufacture of tubes, the skelp or strips to be furnished by the Tata Iron & Steel Co. Agricultural implement makers, makers of wire products, enameled iron ware, jute mill machinery and numbers of other products have already made contracts with the Tata company for a sufficient tonnage to absorb practically its output of steel except that required for the Government railroads and such contracts as already exist, extending forward a number of years.

T. W. Tutwiler has had active charge of the works during the war, the most trying period of its existence, and deserves great credit for the work done, as evidenced by the balance sheet. Other men, namely, Robert G. Wells, Dr. A. McWilliam, A. E. Woolsey, Ralph Watson and H. E. Judd, have contributed greatly to the overcoming of initial obstacles.

In regard to the new plant and additions to the old plant of the Tata Iron & Steel Co., about eighteen months ago word was cabled to the effect that the plans should not interfere with the growth of the plant ultimately to ten blast furnaces, with the necessary steel plant. These latter instructions caused serious changes in the plans and made it necessary to put all of the new mills in a new locality with the exception of the plate mill, which was at that time under construction.

The plans which are being carried out for the present development contemplate a total tonnage of 700,000 tons of pig iron and 580,000 tons of steel ingots converted into 425,700 tons of various finished product. The new equipment going in to take care of this increase in tonnage is as follows:

Three batteries, 150 ovens total, of Wilputte design coke



PRESENT AND PROJECTED WORKS OF TATA IRON & STEEL CO., LTD., JAMSHEDPUR, INDIA

The greater extensions, as they are termed, of the plant of the Tata Iron & Steel Co., consist of five more 600-ton blast furnaces with their necessary coke ovens; a new, large Mackintosh-Hemphill blooming mill; a Morgan continuous sheet bar and billet mill consisting of six 24-in. stands and six 18-in, stands with vertical rolls for edging sleeper plate and skelp. Beyond this mill is located a sheet mill, the present capacity of which is 35,000 tons annually, and a Morgan continuous merchant mill. To supply the steel for this practically new plant, 25-ion Bessemer converters and 200-ton tilting open-hearth furnaces are being installed. The present pig iron production of the Tata plant is 1000 tons per day, and on the blowing-in of the two furnaces nearing completion the product will reach 2200 tons per day.

When the five additional stacks are completed, the capacity will be 5200 tons per day. The company is under contract for several years to furnish 100,000 tons a year of pig iron

to Japan.

A new combination rail and beam mill will be of larger capacity than the existing mills.

The number of employees has now gone up to 26,000 Indians and about 180 Europeans.

Since the starting of the Tata enterprise, there has been a great increase in the rate of wages paid. Common labor now commands from 8 to 11 annas per day, or 16 to 22 cents: skilled labor, from one rupee to one rupee six annas, or, at the former rate of exchange, from 32 to 42 cents per day of 8 hr.

ovens with full by-product and partial benzol recovery plant.

Two modern skip filled furnaces, 17 ft, hearth, 22,189 cu. ft. content, from which it is estimated that the pig iron prowith the high grade ores in India will be anywhere from 500 to 600 tons per day.

Two 100-ton tilting duplex type open-hearth furnaces with two 25-ton converters and a 1300-ton mixer.

Provision has been made for the installation of a 250-ton recarbonizing mixer-a third converter if necessary, a third duplex tilting open hearth and three electric furnaces.
The complement of mills is as follows:

A 40-in, two-high reversing motor-driven blooming mill with hydraulic manipulator and followed with hydraulic shear. This mill will serve a 24-18-in, Morgan continuous mill in

direct line with the blooming mill for the rolling of sheet and tin bars, billets from 1% in. square to 6½ in. square, some slabs, and it is proposed to finish on this mill a comparatively small tonnage of skelp and sleeper plate. Both these latter are to be reheated.

The blooming mill will also serve direct with provision made for wash heating or the reheating of cold stock in bottom type furnaces, a 28-30-in. combination rail and structural mill which will be installed without a rougher, but with provision for and the foundation built for the putting in of a two-high reversing motor-driven rougher some time in In case of shut-down or breakage on either the continuous mill or the combination rail and structural mill,

the full tonnage of the blooming mill can be handled into a hot hole. The blooming mill will make some slabs for the plate mill, while it is contemplated that about 40 per cent of the plate mill production will be rolled direct from slab ingots.

The Morgan mill delivers billets and sheet bar underneath a 120-ft. runway, which is being put up at the present time. for a distance of about 880 ft. One end of this present length of 120-ft. runway will handle the stock for and serve a 12-in. Morgan merchant mill, to which mill has been added two stands of 8 in., independently motor driven, for the rolling of a small tonnage of wire rod.

At the other end of the present length of the 120-ft. runway there will be a covered section for the storing of sheet bars for a 9-mill, 14 pair roll, sheet mill.

This covered section of the runway is also to deliver 30-ft.

length sleeper plates into the plant for the manufacture and pressing into sleepers or metal ties.

The plate mill had to be left in the original location intended for all of the mills before the last proposed increase in ultimate tonnage, and consists of a two-stand, three-high tandem motor-driven, 34-96-in, plate mill with four-bottom type reheating furnaces and room provided for eight.

In regard to further extensions beyond the mills being built at the present time, the territory adjacent to the tandem plate mill lends itself for the installation of any additional plate mills, either light or heavy.

The 120-ft. runway mentioned above has been laid out for

extension to serve in the future, additional merchant mills, rod mills or cotton-tie mills at one end, and additional sheet mills or jobbing mills at the other end.

Provision has also been made for the probable installation in the future of an intermediate size light structural mill.

There can be a total of seven blast furnaces built in the present line, four of which will be large size and modern type and the other three left of intermediate size, for making foundry iron, ferromanganese or special iron.

In close proximity to the duplex open-hearth plant there has been a future line of six blast furnaces laid out, making it possible ultimately to enlarge the plant to a capacity of 13 blast furnaces total, or an estimated pig iron production of 2,100,000 tons.

Provision has also been made for another three-furnace duplex open hearth adjacent to and of the opposite hand to duplex plant No. 1 and for the installation of a limited number of 75-ton stationary furnaces at the old plant.

George Otis Smith on Thrift in Coal

Duty of Conservation Placed Squarely Up to the Steel Industry— Largest User Next to the Railroads

GEORGE OTIS SMITH, director of the United States Geological Survey, Washington, in his address at the banquet, spoke in part as follows:

"The steel industry required in 1918 about 100,000,-000 tons of coal, slightly more than two-thirds of it in the form of coke. So in dependence upon coal, your industry stands next to the railroads. At the bottom of the list of uses of coal, stated quantitatively, is blacksmithing, and the annual requirement of blacksmithing coal is less than 1,000,000 tons. Contrast with the great steel plant, which consumes its 4,000,000 tons of coal each year, the village smithy, which uses 50 pounds a day—and the question arises, Where is it of greater national concern that we begin to practise thrift in coal at the little shop or at the big steel works? During the war the patriotic effort was made to save wheat and sugar in every home, however humble, and the aggregate results of such nation-wide thrift were most gratifying; yet with coal a different policy of initiating thrift seems warranted—the great industrial establishment or the superpower plant rather than the home is the place where saving will accomplish most.

"We are on the threshold of fuel economy. cedented high prices for coal have summoned American genius to the task of getting the full value out of the half billion tons of bituminous coal we burn each year; indeed, we have been too long content simply to burn coal rather than to use it. With coal at a dollar a ton the consumer was the profiteer, and profiteer-like he thought it paid him to disregard any claims except those of his own immediate gain. Now, the higher prices have opened our eyes to higher values in coal Now, the higher and we begin to see the possibilities of profit in avoiding waste both in the mine and in the boiler room. We do not have to recognize the claims of posterity for coal conservation, for we can see money in it for our own generation-to mine the coal that we have been leaving underground, to utilize every possible heat unit in what we burn, and especially to recover everything of value

that the coal contains.

Steel Industry Should Lead

"As the largest user of coal, next to the railroads, your steel industry can most appropriately lead off in defining this issue, and meeting it in a way worthy of American engineering. The scale on which your industry operates makes your possible contribution in coal economy a large one, and your experience in stopping leaks and in turning losses into profits simply justifies the nation in putting the question to you: Is the American Iron and Steel Institute, with its splendid equipment of engineering and financial talent, as well as its unparalleled command of capital, doing all it can with the 100,000,000 tons of coal it receives each year?

"It is customary to express our coal resources in terms of tons in the ground, but how inflated such an inventory becomes when we realize that of the ton of coal 'in place,' where Nature stored it for the use of man, the amount converted into mechanical energy, under the average practice of to-day is only 76 pounds! The accompanying diagram (Fig. 2) exhibits the dis-

tribution of the losses thus indicated, in the responsibility for which mining engineer, mechanical engineer and consumer must all share. This general indictment of 'average practice' makes the question of thrift in coal a national rather than an individual problem.

"The proportion of coal we leave underground is a sad commentary on our appreciation of the value of coal, and the margin between high recovery, which may be stated at 95 per cent, and the average recovery of 70 per cent or less shows to what extent we are still wasting our coal at one place alone and where the world

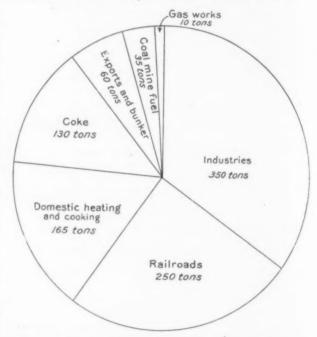


FIGURE 1. WHAT BECOMES OF OUR COAL—DISPOSITION OF THE MINER'S YEARLY OUTPUT

The average yearly output per man employed underground in America is about 1000 net tons. The diagram shows the uses to which the 1000 tons are put, including both anthracite and bituminous coal.

does not see the waste. By increasing the average output of the mine worker we have made a gain of 50 per cent in the last three decades, so that we are saving man power if not coal.

Saving by Electrification

"Not only is coal wasted in the mining, for no sooner does a ton reach the surface than 44 pounds of it is taken as toll for running the mine—indeed, in the anthracite mines, where often more water is raised than coal, the combined pumping, hoisting and breaker operating cost expressed in coal has been stated as high as 200 pounds to the ton. But electrification of coal mines is gradually coming with gratifying results in efficiency of operation and economy of fuel. In the mines of

Legan County, W. Va., the saving in coal effected by supplying power from a central station has been estimated at 50 to 75 per cent, and the experience of the Lehigh Coal & Navigation Co. at its Rahn colliery is no less satisfactory. A hoisting test by this company showed that in steam practice the 'stand-by' consumption of coal was nearly equal to that of the working

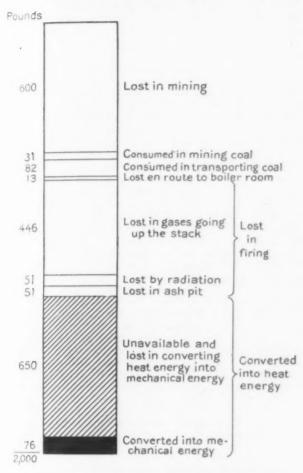


FIGURE 2. EIGHT LOSSES IN COAL UTILIZATION

Under ordinary conditions of mining and firing out of every 2000 lb. of steam coal in place in the mine, only about 76 lb. are converted into mechanical energy. The other 1924 lb. are either unavailable or are absorbed by the eight losses shown in the diagram.

This means a recovery as power—the ultimate objective—of only 4 per cent of the resource, assuming steady operation. Allowing for further loss due to bad load factor, as is done in Fig. 3, the recovery as power becomes perhaps 1 or 2 per cent.

hours. It is wholly conservative to figure that 50 per cent of coal now used in mine operation can be saved by simply extending electrification from central stations, even though this carrying of power to the mine mouth might seem illogical.

"The consumer cannot evade his share of responsibility, because of the 1274 pounds of coal delivered at his boiler plant 548 pounds was lost in firing; he had been buying B.t.u.'s simply to throw away 40 per cent. Edwin Ludlow relates his observations at a large plant, where pride was taken in the fact that only the highest grade coal was used, a standard of 15,000 B.t.u.'s being insisted on, but Mr. Ludlow called the attention of the company's executive officer to his boiler-room leaks, his steam results showing that he was obtaining only 11,000 B.t.u.'s from this high-grade coal. That coal used needed expert firemen more than chemists—better practice rather than more theory.

"Another measure of coal waste in the generation

"Another measure of coal waste in the generation of power, even where the conditions promoting efficiency are much more favorable, is afforded by the records of the public utility plants of Massachusetts. During the month of June last the average coal consumption in all these plants was 2.29 pounds per kilowatt-hour, but at the largest plant of the largest company the average

was 1.8 pounds—a saving in coal of more than 20 per cent, representing the difference between best practice and average practice.

Country-wide Saving

"How to save coal on a country-wide scale is the question. O. P. Hood of the Bureau of Mines has made the point that in a boiler plant construction, operation and fuel are to a certain extent interchangeable. Skilful planning and careful operation can take the place of part of the coal; and on the other hand cheap coal has made possible careless firing of poorly constructed boilers without the wastefulness of the whole procedure being apparent on the books. Waste that can be seen only as a theoretical proposition does not appeal with the same force as waste that writes itself in red figures; and now that coal is no longer as cheap as dirt but has taken on the dignity that comes with high prices, we naturally begin to think of careful use. Just as we learned with foodstuffs during the war we are learning now that the higher value must be both given to coal and won from it. Thus the opportunity has arrived for the fuel engineer to teach us thrift in coal.

"The statistics of fuel consumption show that the average steam plant, which is a small one, uses eight times as much coal as is necessary in the largest central stations, where the profit payable to thrift is recognized. If to this initial saving of seven pounds of coal out of eight at the electric power station are added the possible savings on the railroad and the mine, the ratio between present average practice and present best practice becomes nearly 12 to 1. Even if this indictment of waste is discounted one-half, the power users of this country stand convicted of almost criminal negligence, for cheap power and plenty of it pro-

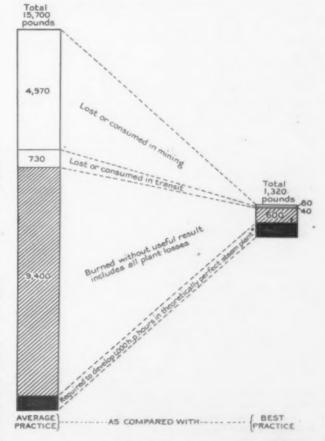


FIGURE 3. AVERAGE AND BEST PRACTICE IN COAL UTILIZATION

To develop 1000 hp. hours, a theoretically perfect steam engine and boiler would require about 600 lb. of coal. Actually under ordinary practice we mine or destroy perhaps 15,-700 lb. of coal in the seam in order to develop the 600 lb. of energy. The best practice does the same work with about 1320 lb. of coal. In other words, the best practice uses only a tenth or a twelfth as much as the average.

a tenth or a twelfth as much as the average.

The losses in average practice here shown are calculated as in Fig. 2, except that in this case allowance is made for the additional loss due to bad load factor.

vide the only way to retain America's industrial leadership. For this reason both labor and capital are vitally interested in the power supply.

An Impressive Contrast

"This contrast between the wasteful and the economical use of our coal resources is set forth in Figure 3, which, like Figure 2, was compiled by my associate, F. G. Tryon. Starting with the 600 pounds of coal that contains heat units equivalent to 1000 horsepower-hours, we find that the big electric station, with its modern steam turbine equipment, uses along with the 600 pounds of coal another 600 pounds from which it derives no return. This seems wasteful enough, but the little steam plant, with its poor load factor as well as much less efficient equipment, losing heat units up the stack, in the ash pit, through the steam pipes, and in the engine, wastes 9400 pounds of coal for every 600 pounds it really utilizes-nearly a 16 to 1 ratio in favor of the big plant. So, too, if railroads and mines were electrified and only 5 per cent of the coal instead of 30 per cent were left underground, 120 pounds of coal would mine and bring to the big plant the coal burned in generating 1000 horse-power-hours, instead of the 5700 pounds now actually required in serving the average steam plant with the five tons of coal it burns to get the same product of useful energy. The total cost of 1000 horsepower-hours in terms of coal resources is therefore about two-thirds of a ton with efficient use and nearly eight tons under average conditions of

"It is cause for general satisfaction, then, that in the first half of 1920 we find the power output of the central stations of the country increased more than 16 per cent over that of the corresponding period last year, while the fuel used seems to have increased not over half that percentage. In these public utility plants the trend is decidedly toward fuel economy.

"The use of coal in America for making coke dates back some 80 years, but the operation of by-product ovens covers only one-third of that period, and indeed only last year did the output of by-product coke first equal that of beehive coke. The field is thus divided between the old and the new practice, but two advantages of the by-product ovens over the beehive ovens alone show how much the full substitution will mean to our country. First, the yield of coke in the by-product ovens compared with that in the beehive ovens is 23 to 25 per cent greater with the low-volatile coals and 7 to 8 per cent greater even with the high-volatile Pittsburgh coal; and, second, the recovery of 7 to 15 gallons of tar, benzol, toluol and other oils, 16 to 30 pounds of sulphate of ammonia, and the surplus gas constitutes a great resource by itself.

By-Product Practice

"By its very name the by-product practice suggests not only saving rather than waste but the lower cost of the chief product thereby made possible. The experience of the leading producer of metallurgical by-product coke affords conclusive evidence that in the Pittsburgh district this coke can be furnished to the furnace at so much lower cost than the beehive coke as to give an ample return on the large investment required. It is very profitable to save the by-products, yet the fact must be faced that beehive ovens have been within the reach of operators who had relatively little capital, whereas a modern by-product plant on an efficient scale involves an investment of many millions. Conservation of the full value of coal is not a poor man's proposition.

"Already fuel economy has reached so high a mark in the largest steel plants that the present practice gives gratifying results. Take, for example, such a plant with an annual fuel consumption equivalent to perhaps 4,500,000 tons of coal, and we find there the best by-product coke practice with utilization of the by-product gas and tar for melting and heating throughout the plant; also the waste gases from the blast furnaces are used in gas engines to blow the furnaces and generate electricity to meet the extensive demand throughout the works both to operate cranes, machine shops, etc., and in motors to drive not only the smallest but also the largest rolling mills. But to picture the extension of this thrift in the use of coal as planning on a national scale demands, we are forced to supply some conditions that are not yet realized. This use of coal first as a raw material and next only in part as a fuel means the extension of by-product practice until in no home or public building or factory will we find raw coal burned, but in its place either coke or gas, the other products having first been extracted to furnish the fuel for our motor cars, the dyes for our clothes, the surface for our roads, and even the drugs for our aches and pains.

Unwarranted Optimism

"The fact that more than half of the world's coal reserves are believed to lie within the territory of the United States has led too many of us into unwarranted optimism. The captains of the great industries concentrated along the Atlantic seaboard will do well to think less of the millions of millions of tons of coal that are said to lie awaiting their need in various parts of this continent-wide country of ours, but rather to ask for details as to where this coal is and how available it is for the use of this and the next generation. The total tonnage involves strings of figures hard for us to comprehend, but the tonnage remaining in the great producing fields of the East is so limited as to compel us to foresee their exhaustion within periods of the same order of magnitude as those which you executives figure as the expectancy of life for your industrial enterprises. For example, the Pittsburgh bed in Pennsylvania was estimated 40 years ago as good for 30 generations, but the rate of mining has so greatly increased that now we must measure the exhaustion of this largest bed in the Keystone State by the span of a single generation.

"Thrift in the use of our supplies of raw materials becomes a national duty that is especially urgent in relation to minerals, because of these there is only one crop to harvest. Moreover, as the stewards of the largest coal resources in the world, we are under some obligations to the less favored peoples. In the exportation of coal we need not be so prodigal as we have been with our oil, but neither can we withhold our coal from

those who need it."

Authors of Paper Read at Meeting of American Iron and Steel Institute

(Continued from page 1105)

F. L. TOY, whose paper was on The Basic Open Process, graduated from Lehigh University in 1909 in electrometallurgy. He spent the next two years on the electric furnace in the open hearth department of Homestead works, Carnegie Steel Co. From 1911 to 1916 he was assistant chief metallurgist. From 1916 to 1919 he was superintendent of open hearth departments Nos. 1 and 2 and foundry. 1919 he has been superintendent of open hearth department at the Homestead works.

P. PERIN, one of the country's leading iron and C. steel metallurgical engineers, was born at West Point, New York, in 1861. He graduated from Harvard University in 1883, and later from the Ecole de Mines in Paris. One of his first connections was with the Carnegie Steel Co. at Braddock, Pa. Later he was identified with the blast furnace plant at Middlesboro, Ky., now owned by the Virginia Iron, Coal & Coke Co. Later he was president of the Embree Iron Co., Embreeville, Tenn. Mr. Perin built the coal-mining plant at Keokee, Va., and served as president of the company that conducted coal and coke operations there. This company later was consolidated with the Stoneta Coal & Coke Co. For 17 years Mr. Perin has been consulting engineer for the Tata Iron & Steel Co., Janshedpur, India. In 1916, with S. M. Marshall, he formed the consulting engineering partnership of C. P. Perin and S. M. Marshall, New York.

Owing to shortage of orders and the necessity of making repairs, the Buckeye Jack Co., Alliance, Ohio, has closed its plant until Nov. 1, affecting 300 men.

New Magnetic Testing Apparatus

Determinations Obtained on Steel Rails, Rods, Wire, Cable and Strips with Non-Destruction of Material by Defectoscope

EFECTOSCOPE is the name given by the inventor, Dr. Charles W. Burrows, magnetic research engineer, Grasmere, New York, to a new device for the magnetic testing of steel. Magnetic testing is, of course, non-destructive of the material tested, can be applied to every piece in question, and is not limited to a few representative samples. test obtained by the Burrows instrument, it is pointed out, can provide an estimate as to the correctness of the drawing temperature, and can be conducted by one of ordinary technical training. It is especially adapted for use in determining defects in steel wire, rods, rails, eables and strips.

The simplest test, and one which promises to be of the greatest value, is the determination as to whether or not the test piece is of the same magnetic characteristics as the original standard sample. By the proper selection of the characteristics to be measured a single determination may be made to settle the question.

There are essentially six elements in the magnetic defectoscope. First the bar must be magnetized. In the general type of apparatus the magnetization is effected by a relatively short solenoid energized by a direct current of such value that the magnetization of the specimen is carried well beyond the knee to the induction curve. The second element is the means for detecting magnetic variations in the bar. This detector consists of two test coils having the same number of

turns and surrounding the specimen.

The magnetizing solenoid and the detector are rigidly connected together and are given a relative motion along the length of the specimen by means of a suitable motor which forms the third element of the system. As the detector occupies different positions along the length of the test material, it is threaded by an induction which depends upon the nature of the specimen. If the specimen is not quite uniform the magnetic induction threading one to the coils and the detector is different from the magnetic induction threading the The result is the electromotive force generated in one of the test coils is different from that generated in the second test coil. Consequently, the small differential electromotive force is impressed upon the detector system every time it passes over the magnetic inhomogeneity.

The double test coil is used in order to eliminate the effect of any electromotive force which might be induced by variations in the magnetizing force.

ordinary commercial direct-current power circuit can thus be used as the source of magnetizing current.

The fourth element is an indicator which must be responsive to the small electromotive force developed in the detector coils. For this purpose use is made of a heavily dampened D'Arsonval galvanometer of short The indication given by the galvanometer is recorded by the fifth element of the equipment.

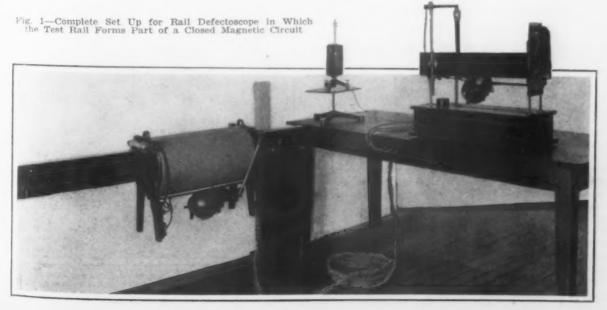
The recorder is essentially a photographic film caused to move uniformly across a small slit through whose opening a spot of light is reflected by the galvanometer. The sixth and last element is the control box, which contains all the necessary electrical switches, rheostats and instruments.

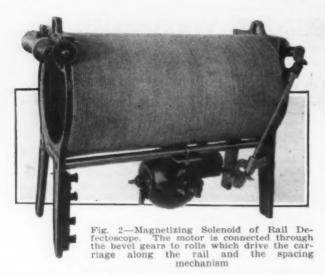
Rail Defectoscope

In the rail defectoscope the magnetizing solenoid, the detector test coils and the electric motor for driving the equipment over the rail are mounted in one unit, as

The elements of the carriage can be readily seen in the illustration. The magnetizing solenoid is wound with well-insulated copper wire on a brass tube approximately 10 in. in diameter and 20 in. long. The carriage itself travels on two rollers, one of which is driven through bevel gears by means of a small electric motor attached to the supporting frame of the solenoid. Actuated by the second roller through a pair of gears is a pair of electrical contacts which are closed momentarily when the carriage has traveled a distance of 3 ft. Of the two pair of binding posts, mounted on one leg of the carriage, one connects to the magnetizing solenoid and the other pair to the detector coils. The detector coils, which are not visible in this illustration, are shown in Fig. 6.

Fig. 4 shows the camera and control box mounted in one unit. The camera proper is mounted in a slide opposite a horizontal slit in an elongated dark box. The camera is caused to move across the slit by means of suitable gearing connected to an electric motor mounted on the underside of the dark box. The control box is shown beneath the camera box. On the sides of this box are mounted the necessary switches and rheostats for the operation of the apparatus. ammeter for indicating the current in the magnetizing solenoid and the electric lamp used with the reflecting galvanometer are also shown mounted integral with the apparatus. On the sides of this box are mounted the





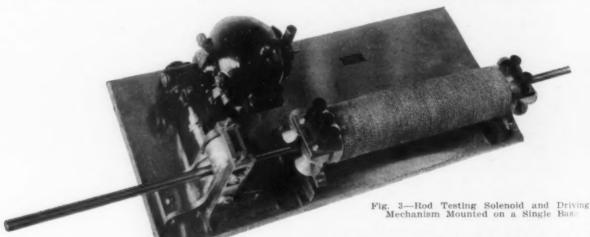
necessary switches and rheostats for the operation of the apparatus. The ammeter for indicating the current in the magnetizing solenoid and the electric lamp used with the reflecting galvanometer are also shown mounted integral with the apparatus.

The complete set-up for the rail defectoscope is shown in Fig. 1. The test rail forms part of a closed

5 illustrates how the wire testing solenoid may be mounted for examination of wire in the course of production. The means for drawing the wire through the coils are not shown, since they depend upon the quantity to be tested and the process of manufacture. In many cases the apparatus may be placed so as to test the wire during its process of manufacture, and thus make use of the commercial method of causing the wire to move from one stage of manufacture to another.

Cable Defectoscope

The magnetic examination of cables is quite similar to that for wires. Fig. 7 shows a cable defectoscope attached to a frame work with the cable under test passing through it. Records are made photographically as in the case of rails. A multiple cable defectoscope for the examination of the several cables of an elevator is under development. The recording part of this proposed apparatus will be placed where it can be readily operated by the engineer in charge or by the inspector. With this apparatus each cable of each elevator can be examined every day and a photographic record of its condition may be made. Ordinary defects of service wear and tear will appear gradually. When the elevator cable is new the record w.ll appear as a straight line. When a break in a single wire develops the record will show a sharp notch in the original straight line. As other wires break or strains result from extra



magnetic circuit by resting at its extremities upon two I-beams connected by an auxiliary rail. The camera is shown pointing at the galvanometer. The camera is raised to its upper position, in which the light reflected from the concave mirror of the galvanometer is focused upon the ground glass attached to the bottom of the camera case. In the foreground is seen the cable connecting the carriage to the control box.

With the apparatus set up as shown in Fig. 1 the only procedure necessary to secure a record of the magnetic homogeneity of the rail is to operate the appropriate switch, and 30 sec. later to develop the photographic film.

Rod Defectoscope

The essential elements of the rod defectoscope are the same as those used in the examination of the rail. Because of a smaller size of the material to be tested, it is more convenient to cause the rod to pass through a stationary solenoid rather than to hold the rod stationary and move the solenoid as done in the rail defectoscope. The galvanometer recording equipment and control box is substantially the same as that employed in the examination of steel rails. If a permanent record is not desired the photographic part of the equipment may be replaced by a translucent scale or a telescope and scale. Fig. 3 shows the solenoid of the rod defectoscope with the driving mechanism, mounted on a single base.

Wire Defectoscope.

The magnetic examination of wire is carried out by means of equipment quite similar to that for rods. Fig.

tension in the wires caused by the original broken wire or wires, the irregularity in the record becomes more conspicuous. Thus there will be an infallible indication when the cable is deteriorating and needs careful visual

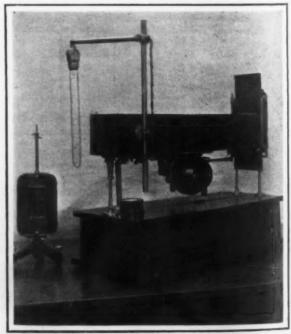


Fig. 4—Rear View of the Camera and Control Box Mounted as One Unit. The variations in magnetic homogeneity are indicated by a ray of light cast by a galvanometer on photographic film

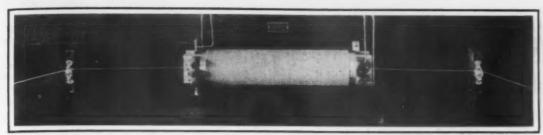


Fig. 5-Magnetizing Solenoid for the Examination of Steel Wire in Course of Production

inspection or possible removal. After the engineer in charge becomes familiar with the irregularities of the record and the corresponding defects in the cable he will soon be able to estimate from a visual inspection of the photographic record how near the cable is to a dangerous condition.

Elevator Cable Defective

The following news item was clipped from the New York Tribune of Sept. 4, and is illustrative of the importance of a testing apparatus such as that described for the detection of internal defects in elevator cables:

An inquiry into the cause of the elevator accident in the Clarendon Building, Eighteenth Street and Fourth Avenue, last Tuesday came to an end yesterday after Assistant Dis-

Mechanical inequalities in band steel which is used in the manufacture of phonograph motors is largely responsible for certain defects in phonographic performance. The magnetic examination of such material would enable the manufacturer of spring motors to build motors of uniform performance and to guarantee the performance of each individual motor.

The test methods so far mounted have been confined entirely to the examination of rectilinear material. The same fundamental principles may be applied to the examination of material which possesses circular symmetry. Work has been done on large disk-shaped forgings by applying successively to the various parts of the disk a given magnetomotive force and noting by means of suitable detector coils any variations in magnetic homogeneities which may occur. Investigations along this line have been in progress for some time and

Objects of circular symmetry which are small in



trict Attorney Marro questioned three witnesses. The accident resulted in the death of three persons and the injury of fourteen. Those questioned were P. F. Foley and Charles Dreier, building inspectors of the Aetna Insurance Company. Foley and Dreier inspected the elevator on April 4th and found it to be in good condition. Both inspectors examined a piece of cable taken from the wrecked elevator and reported a defect on the inside of the cable which is not noticeable on the outside.

Here is a case of a fatal elevator accident, in spite of the fact that careful inspections had been made. The final cause of the accident was due to defects in the material which would escape purely visual examination. Is it presumptuous to hazard the opinion that this disastrous accident with its resulting loss of precious human life would not have occurred if this elevator system had been guarded by the magnetic cable defectoscope which would have given ample warning to the superintendent of the building that the cables were approaching a dangerous condition?

Ribbon Defectoscope

The magnetic defectoscope lends itself quite readily to the examination of strip material. Material of this shape is widely used in the manufacture of band saws, hack saws and coil springs.

examination just described. Small circular objects are best examined magnetically by placing them in a rotating magnetic field and measuring by the same suitable device the magnetic torque exerted on the specimen by the rotating magnetic field. In this case the quantity measured is not the permeability. It is rather a combination of residual induction and coercive force. Roughly it is proportional to the product of these two quantities and substantially equivalent to the magnetic hysteresis of the material.

Undeveloped Field of Magnetic Analysis

In addition to the work which has already been done on rails, wires, rods and cables and upon specimens having circular symmetry such as ball races, balls and milling cutters, there is great opportunity for additional development along similar lines. Tires, gear rings, roller bearings, disk blanks and circular saws, are important steel products whose magnetic examination gives great promise. Specimens such as drills, reamers, taps and other small tools have received but little investigation and yet are of sufficient importance to warrant consideration. Small irregular shapes, such

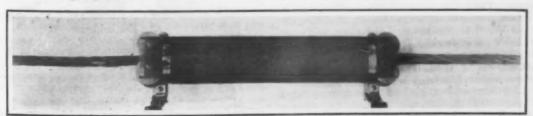


Fig. 7-Cable Defectoscope Showing Cable Under Test Passing Through It

as cutlery, gravers' tools, small machine tools and chain links, need investigation. Large, irregular shapes may present difficulty, but in many cases there is sufficient promise of success to justify investigation. At the present time there is no satisfactory method for the examination of crankshafts, steel bottles, band saws and a great variety of miscellaneous shapes. Other problems for which the magnetic test may yield a satisfactory solution are the degree of malleabilization, the depth of case hardening, the degree of perfection of welded joints and study of strains induced in the various elements by the repeated stresses of the service tests.

Many Safety Devices Increase Service of Cranes*

Accident-Preventing Features of Overhead Electric Types from the Standpoint of Construction and Design

BY NICHOLAS PRAKKEN+

PRESENT day methods of production call heavily upon the electric overhead traveling crane, electric overhead transfer crane, and the electric cage or floor controlled monorail hoists. Without this general class of equipment progress would be seriously impeded, for hoisting equipment is almost universally used in one form or the other in all of the industries. There are as many different types of cranes and hoists to-day as there are different kinds of service that demand them. This address will be confined to the class of cranes that are used in foundries, machine shops, yards, shipways and warehouses.

The electric cage-controlled monorail hoist is often used in connection with transfer bridges in the same capacity as a crane, with the added flexibility that it can leave its bridge and travel to remote points on permanent overhead I-beams, either to pick up a load or to deliver one. Electric floor-controlled hoists have the same flexibility but limited in speed by what a man With the electric cage or floorcan cover in walking. controlled monorail hoist accessories are available for its flexibility of operation, such as switches, and turn tables. These accessories, incorporated in a system with curves, makes it possible to give service to the different parts of a plant.

Electric Overhead Cranes

The standard electric overhead traveling crane is the most serviceable of all. The girders span from wall to wall and the entire crane usually runs the entire length of the building, passing over workmen with its burden. The crane is composed of three units—bridge, trolley and cage.

The bridge is composed of truck ends, girders, bridge machinery, foot walks and electrical equipment. The safety features that safeguard the workmen are naturally a part of the design. The first essential is liberal strength in the properly proportioned parts of every unit piece in the crane.

The truck ends must carry the total weight of the girders, trolley and load. The truck ends in a welldesigned crane are usually of a box section with caststeel truck housings securely riveted in between the channels forming the side members of the truck ends. It is in the truck ends where the safety features are found. Rail chocks are provided on the steel housing that project 1 in. or more below the top of the runway The rail chock will prevent the truck end from leaving the runway in case of a wheel breaking. The truck ends are also provided with rail fenders made of steel plate that fit over the rail. Their function is to brush a workman's hand off the rail. Spring bumpers are likewise attached to the top of the cast-steel truck housing to prevent the wheels of two cranes on the same runway running into each other. The M. C. B. bearing is used almost universally. In this bearing the wheel is keyed to the pin and the pin revolves in bronze journals on both sides that are most accessible and readily renewed.

Girders depending upon the span and capacity of the crane are either I-beam, I-beam and channel, web girder, lattice box or box girder. The girders most used are the I-beam and channel and the box. The I-beam and channel girder is used on medium span and capacities up to 15 tons. The box girder is usually built up to about 125-ft. span, and any reasonable capacity. The girders should be strong enough to prevent undue lateral deflection. The greatest load will be imposed upon the girder that has the bridge machinery and foot walk mounted on it. The safety feature in the girder mounting is the coping of the girder around the box section of the truck ends, and securely fastening the two together by top angles, vertical shear angles and bottom cover plates. Many cranes are assembled by merely bolting the girders to the tops of the truck ends. This method permits the trucks to rock if a bolt becomes loosened. With the girders coped into the truck ends the bridge becomes an entire structural unit.

The addition of the motor bracket with the motor, the entirely inclosed bridge motor-drive gear case and gears, the bridge machinery and foot walk produces a torsional strain in the girder. The girder can carry this load more safely when coped into the truck ends than if set on top. The safety features in the foot walk are strong angle iron hand rails and the running of the floor boards solid to girder, with a 6-in. angle iron bordering the foot walk so no tools or parts can be kicked off. Often foot walks are provided on both girders of the crane. It is advisable but not necessary, unless the trolley is of such a design that an extra foot

walk is imperative.

The component parts of the trolley are: trolley sides, girts, gears and gear cases, drums and electrical equipment.

The trolley sides are preferably of box section and provided with M. C. B. trucks and rail chocks. rail chocks function in the same manner as those on the truck ends of the bridge. The structural girts are bolted in between the trolley sides. On the trolley sides and girts are placed the motors, totally inclosed gear cases and gears, equalizing sheaves and the limit switch. The greatest safety feature on the trolley is

the total inclosing of gears and the limit switch.

The safest type of upper limit switch is the one that opens the hoisting motor circuit through a relay. This switch consists of a weight, a cable, a weighted sheave and a connection box. The weighted sheave shaft has mounted on it an insulated arm that closes the relay circuit by the weight attached to the cable. Fastened to the suspended weight is a loop that one of the hoisting cables passes through. Irrespective of the swinging of the load the load block in its upper travel will carry the suspended weight upward, allowing the weighted sheave to open the relay circuit, thus opening the motor circuit and bringing the motor to

The cage contains the controllers, grids, switchboard and foot levers to stop the bridge.

Controllers are either of crank, radial arm or lever control. Preference is usually given to either the crank or lever control. With the crank control the controllers are mounted in the front of the cage similar to the standard street car controller. With lever control the controllers are placed at the rear of the cage in a cabinet and connected to the lever stand by bell cranks and The direction the lever is moved in usually indicated by the direction of motion. A notch in the lever

^{*}Abstract of address before National Safety Council Con-ss at Milwaukee.

[†]Pawling & Harnischfeger Co., Milwaukee.

stand tells the operator when he has his controller in

the off position.

A safe new location has been found for the grid resistences. They are mounted on a sub-floor underneath the floor of the cage. The floor of the cage is provided with trap doors so the grid units can be inspected. The sub-floor is a more convenient place to mount the grid resistance units than upon the foot walk and in addition it eliminates considerable extra conduit and wiring.

The switchboard is located at the back of the cage in a closed cabinet. For inspection or repairs the doors can be opened and by virtue of the inclosing no

casualties can arise.

In the cage is likewise located the foot lever. For inside cranes the bridge momentum is arrested by pressing the foot on the foot lever. In outside cages the brake is normally on and it is released by the operator's foot when he wishes to travel.

On outside cranes a runway lock is employed in the form of a curved arm that falls over a structural member bolted or riveted to the end of the crane runway. This lock will hold the crane securely to the runway in case of a heavy wind.

Maintenance Safety Devices

Many different methods are used to keep the crane out of service during repairs. Often one or more maintenance men are busy repairing different parts of the crane. As a safety measure in such a case one side of the main line circuit has three sockets with plugs. To complete the circuit all three plugs must be in. Each one of the repairmen working on the crane keeps the plug in his pocket until his task is completed. When all three repairmen have finished the three plugs will be in their respective sockets.

Another method is to place the main line switch in a box and keep it locked. In case of a temporary breakdown the maintenance man unlocks the main line switch cabinet, opens the switch, and again locks the cabinet. As soon as the repairs have been made, the cabinet is unlocked, the switch closed and the cabinet is locked again. The crane is now ready for operation.

The ease with which repairmen can move about the crane is another item of safety. The ladder reaching from the cage to the footwalk should be so located that the floor of the cage is always beneath the operator. This is not always possible where building clearances demand a limited space for a cage.

Transfer Cranes

The bridge of the transfer crane so far as safety features are concerned is the same as that of the standard overhead electric crane. Instead of the trolley running on the top of two girders, the cage or floor controlled monorail electric hoist runs on the lower flange of an I-beam securely fastened to the box girder of the bridge and forming a part of the girder. This beam registers with a stationary I-beam of the same size and on the same level so the monorail hoist can leave the bridge and travel with its burden over this I-beam track, including switches, to its destination. Provision must be made in the registering so that the beam will be in perfect alignment with the spur beam when it is desired to run off and likewise the ends of the transfer crane beam must be baffled so the monorail hoist cannot run off the ends when not registered with a spur beam.

This is usually accomplished by a baffle that is raised when the locking to the spur beam takes place. In case there are a series of bays in a shop and in each bay is a transfer crane connected by short spurs to the adjacent bays, both ends of the spurs as well as the ends of the beams of the cranes must have interlocking baffles operated from the cage of the monorail hoist. This is necessary to insure a perfect alignment of both cranes so the monorail hoist can travel safely from one

crane to the other without accident.

When either two or three way switches are incorporated in the runway system the spurs as well as the tongue of the switch must be baffled for it is very readily seen that in case a switch is partly thrown and not correctly registered the monorail could run off the tongue between the spur beam connecting with the switch. The baffles are either of the type that drop over the sides of the I-beam or that interlock into the web of the spur beam and the tongue of the switch. If the dropping type of baffle becomes bent the monorail hoist can run underneath the baffle and off the beam so baffled. But in the interlocking type a sufficient momentum must be obtained actually to shear several square webs of cast steel.

In the past, cage-controlled monorail hoists have fallen from their runways when the king pin broke. Two very good methods are employed to-day to prevent this. One is to provide a cast steel collar fastening the hoist and trolley together and the other a safety catch of cast-steel fits around the lower flange of the monorail I-beam but always with sufficient clearance so that it offers no friction to impede the travel of the monorail. The safety catch type is kept clear of the flanges of the I-beam on curves by links attached to the trucks which always keeps the safety catch central with the I-beam.

Where the transfer cranes are floor-controlled the registering and locking is done by means of pendant ropes. The controllers then must be spring returned so that the compression of the springs will return the controllers to the off position when the operator releases his hold on the ropes in case he trips over an object on the floor or falls.

In the case of all transfer cranes, to hold them securely in place while at rest the motor driving the bridge must be equipped with a strong magnetic brake. This brake is off only while the crane is underway and

on always while the crane is at rest.

Good judgment and care exercised on the part of the operators and repairmen is the greatest preventative against accidents. But the above safety devices have proved themselves indispensible and are being furnished as standards by most of the crane building fraternity to-day.

Electric Arc Furnace Regulator

High electrode operating speed and close precision of regulation with freedom from hunting are the important features emphasized for the electric arcfurnace regulator just placed upon the market by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Speeds of 2½ to 3 ft. per min., depending upon the amount the quantity being regulated is from normal, and 5 per cent precision are features particularly emphasized.

The ability of this regulator to incorporate high speed with a narrow current zone is due to the fact that the electrode speed tapers all the way from full to zero as the regulated current approaches its normal value. In other words, within certain limits the restoring speed is approximately proportional to the amount the current in the electrode deviates from normal. This permits the greatest possible electrode speed for a given

current variation.

This feature is particularly appreciated during the melt-down of cold scrap. For small variations in current the speed is slow enough to prevent continuous breaking of the arc and at the same time, when the solid metal begins to cave into the pools of molten metal under the electrodes, sufficient speed is available to permit the regulator to extricate the electrode before the time relay allows the breaker to trip. When the current is turned on a furnace charged with cold scrap it is only necessary to throw the regulator control to the automatic position. Regardless of the position of the electrodes at this time, the regulator will allow each one to run down at full speed until it touches the steel when complete automatic regulation will commence.

One important feature of the regulator is its utilization of the arc voltage as well as the arc current to control the motors. The voltage coils also make the control of each electrode independent of the others in the surface. In fact, one electrode may be entirely withdrawn without disturbing any of the others.

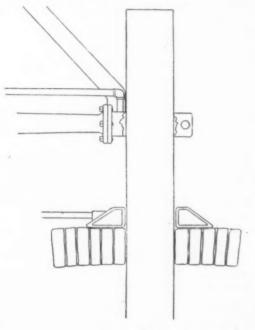
LOSSES THROUGH ELECTRODES*

Heat Data From a Study of a 6-Ton Heroult Steel Furnace

BY M. R. WOLFE AND V. DE WYSOCKI.

The furnace investigated was a 6-ton Heroult electric steel furnace operated by William J. Wharton, Jr., & Co., near Easton, Pa. The problem undertaken was to determine the heat loss of electrodes under actual working conditions.

To measure the temperature, a thermocouple of nickel and iron wire was used, the ends being twisted and fused together and connected with the voltmeter. The thermocouple was standardized by use of an electric muffle furnace in conjunction with a standard platinum-iridium thermocouple. The standard curve thus obtained was used for measuring the temperatures of the different parts of the electrodes, the junction being pressed against the electrode by means of a pad of asbestos on the end of an iron rod.



F16. 1.

The 6-ton furnace was provided with three electrodes, each 38 cm. in diameter, of ordinary amorphous carbon. In working up the calculated heat flow, Hansen's value for thermal conductivity was used, or 0.016 calorie per sec. per cm. cube per degree centigrade.

Each electrode was provided with a water-cooled ring immediately above its exit through the roof of the furnace; also with a water-cooled connection at varying distances above the roof of the furnace, as shown by the illustration.

Heat Losses in Cooling Water

The following tests of each of the three electrodes, determining the amount of water supplied to each electrode and its rise of temperature, enables us to calculate the electric energy represented by the heat in cooling water used by each electrode:

	Electrode	9
1	2	3
Temperature of incoming water, deg. C	12	12
Temperature of outflowing water, deg. C		38.3 26.3
Grams of water flowing per sec 427. Caloriés per sec	8 427.8	427.8 11.251
Kilowatts absorbed 33.		47.1

The total heat in the cooling water for the furnace is, therefore, 123 kw. Since 650 kw. was supplied to the furnace, the total electrode loss is 18.7 per cent of the power used.

In order to separate the heat carried by the cooling water of the upper cooling band from that of the lower band (the cooling water passed in series through the two bands of each electrode), an attempt was made to measure the heat flow into the upper water-cooled connection, by noting the temperature of the electrode below this connection and above it, at a distance of 20 cm. apart, and calculating the heat flow through these sections. The data obtained follow:

_		Electrode	
	1	2	1
	156.7	138	188
Thermal resistance of section of electrode	0.1095	0.1095	0.1095
Calories heat flow1, Kilowatts	6.0	$1,260 \\ 5.3$	1,715
Kilowatts for lower band	32 4	323	20 n

It thus appears that a total of 18.5 kw. was absorbed by the upper cooling contact holders, leaving 104.6 kw. absorbed in the lower water-cooled rings. A small amount of heat is radiated from the electrode between the upper and lower cooling bands, but it is negligibly small in comparison with the heat carried off by the cooling water.

In conclusion, we point out the lack of satisfactory data for the heat conductivity of carbon electrodes of different diameters and at different temperatures. There would seem to be a field for experimental work in this direction.

Various Prices for Charcoal Iron Boiler Tubes

At least three lists now are being employed by the different makers of charcoal iron boiler tubes and these vary not only in the rates, but also in the bracketing of the sizes. Two Eastern manufacturers have abandoned the bracketing of sizes in effect during the period of price regulation and now are quoting as follows:

1 3/4	to	1 1/8	ir	١	 	0	0	 0		0	0	 		0								list plus 20
2 ir	1				 				0	0		 			0	0				0	0	list plus 15
21/4	in.				 				0	0		 	0		0					0	0	list plus 12
2 1/2	in.				 	0	0			0		 	0	0		0	0	0	0	0	0	list plus 10
2 3/4	to	31/4	ir	1.	 	0	۰			0	0	 	0		0		0		0	,	0	list plus 3
3 1/2	to	4 1/2	in		 			x		* 1		,			ĸ							list

One Pittsburgh district maker is using the following list:

1	1/2	to	1	3/4	ir	١.			0	0					0	0		0						0	0				0	0			lis	t	plu	18	2	3
2	to	2	1/4	in			9	0	0		0			0	0					۰	0	0	0	0		0	0	0	0	0	0	0	lis	t	plu	18	1	3
2	1/2	to	2	3/4	in	١.			٠			0					0			0	0	0	0	0	0				0				lis	t	pli	18	,	į
3	to	3	1/4	in			×	×	*	*	*		,	×				*		×	R	*						×	2	j	١,	1	st	p	lus	3 1	1,	Y.
3	1/2	to	4	1/2	in			0	0	0		0	0		D	0	b	0	0	9	0	0	0	0			0		0		0			. ľ	nir	ıu	S	8

Two other producers still are holding to the prices established early in the year. This list is as follows:

ou o a a o a a o ca	000-00	 2	
1% to 13	% in	 	list plus 20
2 to 21/4	in	 	list plus 10
21/2 to 23	% in	 	list plus 1
			minus 1½
31/5 to 4	1/4 in		minus 8

Motor Truck Axle Plant Completed

The new Battle Creek plant of the Clark Equipment Co., Buchanan, Mich., which has been under construction since March 1, is practically completed. Much of the machinery has been purchased and is ready for installation. The plant will be used exclusively for the manufacture of internal gear crive motor truck axles.

The site comprises 23 acres with a 4600 ft. frontage on the main line of the Michigan Central Railroad and a smaller frontage along the Grand Rapids and Interurban Railroad. It is located on the extreme western side of the city. The main building is 99 x 440 ft., and a warehouse parallel to it is 50 x 144 ft. The two buildings are connected by two closed passageways. A third building houses the power-plant. All sales, engineering, purchasing and general administration will be handled as before through the general offices at Buchanan.

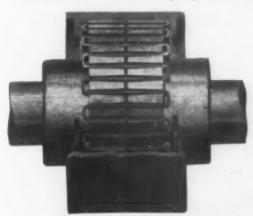
About 40 representatives of the malleable chain manufacturers of the country were entertained Oct. 14 at the Indianapolis plant of the Link-Belt Co. The visit included tours of inspection, lunch at the Country Club, golf in the afternoon and dinner.

^{*}From a paper presented at the fall meeting of the American Electrochemical Society at Cleveland, Sept. 30. The authors are candidates for the degree of electrometallurgist at Lehigh University, Bethlehem, Pa.

Flexible Coupling for Small or Large Shafting

A flexible coupling for shafting designed with large overload capacity has recently been designed by the Wellman Bibby Co., 36 Kingsway, London, England. The coupling, according to the Engineer, is of the clastic type and the makers have such faith in its overload capacity that they are now constructing one to transmit 16,000 hp. required for a rolling mill running at 100 r.p.m. The overloading to which the coupling may be subjected in this service is severe, as the maximum torque sometimes rises to five or six times the normal value.

A spring transmits the torque from one shaft to the other, the effective working length of the spring varying inversely as the load. The spring is of sinuous



Large Overload Capacity Is a Feature of This Flexible Coupling

form, arranged in axial grooves around the circumferences of the coupling flanges. These grooves are a snug fit for the spring at their outside ends, but gradually flare out toward one another. Thus when the coupling is transmitting only a small torque, practically the entire length of each section of the spring is free to bend and accommodate any lack of alignment in the shafts. As the load increases, however, the spring bears against the side of the groove, and the span of the unsupported is correspondingly reduced, with the result that it is better able to withstand flexure. In other words, it is explained, the flexibility of the coupling is automatically adjusted to the load, and is not, as in the case with some designs, so stiff, with the object of meeting overloads, that there is little resilience at light loads.

In order to facilitate assembly the spring is made of several circumferential sections, and each piece has its ends turned over to form nibs which project into recesses in the sides of the grooves, and thus hold the section in place. This precaution is necessary, as the combined action of the turning couple and the inclined position of the spring, when it is loaded, tends to move it and ways in the greener when at work

it endways in the grooves when at work.

The shell, or outside of the coupling, is a plain polished cylindrical drum, fitted with junk rings for the purpose of keeping grease around the spring. The junk rings are kept in position by rings sprung into grooves in the inside of the shell. There are no projections, so that the coupling can be cleaned while running without danger.

The amount of shaft eccentricity, which the coupling will accommodate, it is explained, is more than that which would be caused by worn bearings before requiring relining, or more than the amount by which the bearings may be thrown out of line by the expansion of castings in such drives as those of steam turbines. The couplings are made for both small and large shafts.

Sharp Decline in Coal and Coke

UNIONTOWN, PA, Oct. 25.—The present week has seen a sharp decline in both coal and coke prices, coke dropping as much as \$3 a ton. Coke quotations are around \$14 and \$15, mines. Coal ranges from \$6 to

\$10, depending upon destination, embargoes and quality. There is little spot market for either. Car placements in the entire region have averaged for the week little better than 50 per cent.

"Human Engineering" Taught by Y. M. C. A.

The Worcester Y. M. C. A. is offering a course of instruction novel to Y. M. C. A.'s, labeled "Human Engineering," especially designed for students of Worcester School of Technology and Clark University. The course will consist of nine lectures given by prominent men, on Monday evenings, and distributed over the rest of the year.

The following are the subjects: "The Human Factor in Industry," "The Foreign-Born in American Industry," "Meeting the Needs of the Foreign-Born," "Evolution of the Industrial Worker," "The Labor Union and Industry," "Labor, A Psychological Problem," "Handling of Employees," "Religion and Industry," "The Engineer and the Community."

Nut and Screw Driving Machine

A nut and screw driving machine designed to turn at the rate of 1000 revolutions per minute has been invented by Spencer K. Brown, Syracuse, N. Y. After 12 years of effort the machine shown in the accompanying illustration was perfected. It is now in use in the engine assembly department of the H. H. Franklin Mfg. Co., Syracuse, maker of the Franklin automobile, with which company Mr. Brown is associated.

Plans for the manufacture of the machine have not



Compressed Air Operated Machine for Rapid Driving of Nuts and Screws

been decided upon and little is divulged about the exact method of its operation, save that it is driven by compressed air. The machine, it is stated, will drive nuts and screws of any size and shape without marking the head and will drive a ½-in. nut in a fraction of a second and will either screw or unscrew.

Moving pictures of the manufacture of Shepard cranes and hoists were shown in the parlor of the Sinton Hotel, Cincinnati, on the evening of Oct. 8. R. H. McGredy, sales manager of the company, gave a talk on the application of Shepard apparatus to diversified industries, and A. J. Barnes, director of publicity and export manager, explained the features of the picture. The demonstration was arranged by the J. K. Nickerson Co., Cincinnati, representatives of the company.

Special Steel Casting Made in Philadelphia Navy Yard

The illustration represents a large steel casting made for the U. S. S. Dobbin, in the foundry of the League Island Navy Yard, Philadelphia, in the 3-ton Greaves-Etchells electric furnace supplied by the Electric Furnace Construction Co., Philadelphia. The furnace charge consisted of 14,850 lb. of material and the power consumption for this heat was only 801 kw. hr. per ton. The engineering officer reported that the casting was of fine quality and showed the following chemical analysis:

			P	er	Cent									1	Per	Cent
Carbon					0.38	Sulphur		 		۰	 			0		0.022
Manganese		 			0.89	Silicon					 0					0.33
Phosphorus				0	0.008	Nickel .	 	0	0	0		۰	0			0.69

The full pattern was received from the pattern shop. The drag side of the mold was produced by "bedding in" in the foundry floor, the cope side of the casting being rammed up in flasks. After the pattern was drawn from the mold, the cope and drag were dressed and the cope set upon iron blocks about 8 in.

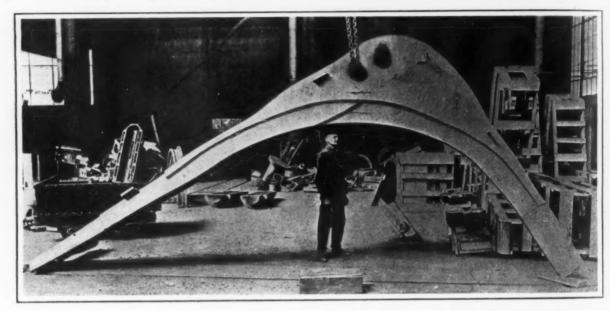
the Great Britain territory since his discharge from the army in France, will be associated with him.

The Simonds Mfg. Co. now maintains plants in Fitchburg, Mass., Chicago, Montreal, Canada, and a steel mill at Lockport, N. Y. In addition to the new British branch, the company maintains twelve branch houses in the United States and Canada.

Will Build Two Blast Furnaces in Holland

Freyn, Brassert & Co., engineers, Chicago, have been appointed consulting engineers for the Royal Netherlands Blast Furnace & Steel Works Co., The Hague, and plans and purchases are under way for the construction of two blast furnaces at Ijmuiden, Holland. The plant is planned along American lines throughout, inclusive of furnaces, hot blast stoves, gas washing, ferro-concrete bins, charging, blowing and other equipment.

The decision of the Royal Netherlands Blast Furnace & Steel Works Co. followed a careful investigation of plants and practice both here and abroad by the officials of the company. The plant will be the first application of American practice in furnace lines, filling, blowing



above the drag. The space between the iron blocks was filled with brick in order to retain the heat within the mold. The drying of the mold was performed by using a low pressure oil burner located at one end of the mold, two days being required.

Physical tests obtained from test specimens cast on this casting were:

No. 1				Tensile Strength, Lb. Per Sq. In. 89,500	25
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The electric furnace in the navy yard has been in operation for about a year, but it is believed that this charge constitutes a record for this class of casting and shows the great adaptability of the electric furnace when properly operated.

Simonds Saws, Ltd., Organized

Simonds Mfg. Co., saw makers, Fitchburg, Mass., and Chicago, have just secured a charter and established a new company in Great Britain, to be known as Simonds Saws, Ltd. An office and shop have been opened at 53 Bayham, Camdentown, London, N. W., where a line of Simonds saw steel products will be carried. The shop will provide for maintenance and repairs of saws, machine knives, and other edge tools produced by the Simonds company.

Guy A. Eaves, formerly connected with the Fitchburg plant of the company has become office manager, and Leon E. Wilbur, a Simonds man, who has covered and general operation with Continental ores and cokes.

Freyn, Brassert & Co., Chicago, have also been retained as engineers by the Algoma Steel Corporation, Ltd., Sault Ste. Marie, Ontario, Canada, for the rebuilding of its No. 3 blast furnace. No. 4 furnace of this company was recently entirely rebuilt by the same engineers, the furnace lines being considerably changed from the original installation; and new hearth and bosh installed.

Maine Foundrymen's Association

A meeting of the newly organized Maine Foundrymen's Association was held Oct. 27 at the Hotel Elmwood, Waterville, Me., to plan for further organization and activities. L. H. McFadden, Androscoggin Foundry Co., Auburn, Me., is president and Orren C. Frye, Watson Frye & Co., Bath, Me., is secretary. There are over forty iron and brass foundries in Maine.

B. & O. Reclaiming Plant

The Baltimore & Ohio Railroad, Baltimore, will establish a new iron reclaiming plant at Front and Williams streets, Cumberland, Md., to cost about \$500,000, including machinery. The site comprises a former rolling mill and car repair works. The new buildings will consist of two rolling mills, three furnaces, foundry and other structures for iron working and parts production. The plant will handle scrap, to be melted, molded and shaped into railroad equipment. It is planned to give employment to about 400 operatives.

MECHANICAL ENGINEERS

Program of Meeting of American Society of Mechanical Engineers in December

The transportation problem will be the keynote of the annual meeting to be held in New York, Dec. 7 to 10, of the American Society of Mechanical Engineers. Among the phases which are to be discussed are railroads, waterways, motor trucks and terminal problems in New York.

Some of the other subjects of the annual meeting

and the authors of the papers are as follows:
Fuels: Fuel Supply of World, by Prof. L. P. Breckenridge; Low Temperature Distillation of Coal, by O. P. Hood; Fuel Conservation versus Money Conserva-P. Hood; Fuel Conservation versus Money Conserva-tion, by D. M. Myers; Form Value of Energy in Rela-tion to its Production, Transportation and Application, by Chester G. Gilbert and Jos. E. Pogue.

Machine Shop: Side Cutting of Thread Milling

Hobs, by Earle Buckingham.

Management: The Life and Work of the late Henry Gantt, by President Fred J. Miller, Marshall Evans, E. A. Lucey, Ch. de Freminville, James J. Butterworth and W. N. Polakov.

Railroad: Static Adjustment of Trucks on Curves, by R. Eksergian; Increasing Capacity of Old Locomotives, by C. B. Smith and Modernizing Locomotive Terminals, by George W. Rink.

Design: Disastrous Experiences with Large Center-Crank Shafts, by Louis Illmer and Foundations for Machinery, by N. W. Akimoff.

Miscellaneous: The Constitution and Properties of Boiler Tubes, by A. E. White and Armor Plate and Gun Forging Plant of the U. S. Navy Department at Charleston, W. Va., by Roger W. Freeman.

Ford Exploration for Iron Ore

The Ford Motor Co., which recently bought some 400,000 acres of land in northern Michigan at a price of about \$7.50 per acre, is to undertake an extensive exploratory campaign for iron ore. Some small parts of the tract lie in proximity to ore fields of the Filch Mountain district, to the Republic area, and to other parts of the Michigan ore region, and it is Mr. Ford's idea that exploration, presumably by diamond drill, may disclose bodies of ore suitable for his use. Only one mine has ever been developed on the lands purchased, and this one is idle. John M. Longyear has been agent for the estate, and has carried out more or less exploration, with but indifferent results.

These lands were bought primarily for timber to be used in the manufacture of Ford motors, and a very large woodworking factory is now under construction at Iron Mountain, Mich. Much of the tract is available for agriculture.

American Steel and Spelter in Wales

Washington, Oct. 26.—Consul A. B. Cooke reports from Swansea that the industries of that section have recently had a novel experience through the arrival upon the market of 1500 tons of American steel billets and 1000 tons of American spelter. Both cargoes were brought in American ships.

"The arrival of American steel and spelter upon this market is the more notable when it is remembered that Swansea is the center of the spelter industry of Great Britain and one of its principal steel-producing

localities," says Mr. Cooke.

This unusual incident in the local commercial world has been commented upon by various local papers.
The following item is from the South Wales Journal

of Commerce (Cardiff):

"'The United States steamer West Imboden has arrived at the King's Dock, Swansea, with 1500 tons of American steel billets from Galveston, Texas, to the order of the British Mannesmann Tube Co., Swansea. Though this is an isolated case so far as the company is concerned, the fact remains that the shippers were

able to send the billets across the Atlantic and yet underquote makers on this side by an appreciable margin. One thousand tons of American spelter has also arrived at Swansea for distribution among galvanizing works in Swansea and the Midlands.'

Reduced Production in the Youngstown District

Youngstown, Ohio, Oct. 26 .- Mill schedules in the Mahoning and Shenango Valleys show a slight recession this week as a reflection of diminished car supply and hesitant iron and steel buying. Two blast furnaces were suspended last week by leading interests. The Republic Iron & Steel Co. is operating at 75 per cent of normal, as compared with 85 to 90 per cent several weeks ago. Brier Hill Steel Co. operations are less active than they have been. Certain of the principal fabricating interests in the district are slowing down and Truscon Steel Co. and General Fireproofing Co. are reported to have cancelled some of their raw material commitments owing to cancellations which they received.

Shipments are meeting with interference due to lack of cars. Accumulated tonnage at the end of the week approximated 1800 carloads, which is 600 cars more than the bottom of the overhang, indicating that all makers are not acting in concert in limiting production

to available car supply.

Under the renewed order of the Interstate Commerce Commission, 19 high-side open top cars are being received in this territory for shipment of pipe to Texas, Mid-Continent and California fields. The assignment is identical with that in force previous to the suspension of all special permits. The order does not permit the shipment of tank plates, valves and any other material except pipe in the specially assigned cars

Youngstown Sheet & Tube Co., Trumbull Steel Co., Newton Steel Co. and the Girard plant of the A. M. Byers Co. are operating close to normal. Carnegie Steel Co. has four of six stacks at the Ohio Works active and nine of 15 open hearths. Owing to lack of cars, Falcon

Steel Co. operations are retarded.

Building for National Research Council

A site for the new building in Washington which is to serve as a home for the National Academy of Sciences and the National Research Council has recently been obtained. It comprises the entire block bounded by B and C streets and Twenty-first and Twenty-second streets, Northwest, and faces the Lincoln Memorial in Potomac Park. The academy and council Memorial in Potomac Park. The academy and council have been enabled to secure the site, costing about \$200,000, through the generosity of the following friends and supporters: Thomas D. Jones, Harold F. McCormick, Julius Rosenwald and Charles H. Swift, Chicago; Charles F. Brush, George W. Crile, John L. Severance and Ambrose Swasey, Cleveland; Edward Dean Adams, Mrs. E. H. Harriman and the Common-wealth Fund, New York; George Eastman and Adolph Lomb, Rochester; E. A. Deeds and Charles F. Kettering, Dayton; Henry Ford, Detroit; Arthur H. Fleming, Pasadena; A. W. Mellon, Pittsburgh; Pierre S. duPont, Wilmington; Raphael Pumpelly, Newport; Mr. and Mrs. H. E. Huntington, Los Angeles; Corning Glass Works, Corning, N. Y. Funds for the erection of the building have been provided by the Carnegie Corporation of New York.

Market in Italy for American Steel

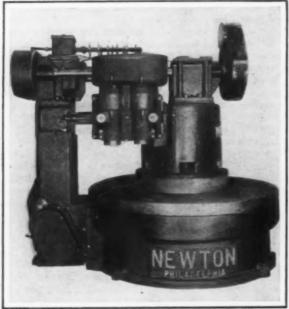
Walter Bates of the Bates Expanded Steel Truss Co., East Chicago, Ind., in an address before the Chamber of Commerce there, said that despite high prices paid to labor and other high costs of manufacture in the United States, the company is able to manufacture steel poles at its plant in East Chicago, ship them and sell them to its plant at Savonna, Italy, for less than the raw material would cost in Italy. Mr. Bates is of opinion that United States concerns can get a lot of European business if they will go after it instead of waiting for it to come to them. Mr. Bates has just returned from Italy.

Ring Table Continuous Milling Machine

The ring table type of continuous milling machine shown in the accompanying illustrations is a recent design of the Newton Machine Tool Works, Twenty-third and Vine streets, Philadelphia. This model retains the same fundamentals of construction as the Newton table type continuous milling machine described in THE IRON

AGE, issue of Sept. 30.

The base is circular in form, providing a central taper column which is bolted and keyed to the base. The cross rail is fitted in the front with one housing containing two spindles for the roughing cut, and on the back of the cross rail, at a distance of 42 in., is a similar housing carrying a single spindle for the finishing cut. The housings for the roughing and



Two Roughing Spindles, Shown Above, and a Finishing Spindle, Shown in the Illustration at the Right, Are Provided on This Newton Continuous Milling Machine. The roughing cutters are not on a radial line, the inner being further advanced so as to cut earlier than the other cutter thus permitting a head with 14-in, centers and with 12-in, cutters to cover a surface which otherwise would require that the cutters be interlocked

finishing spindles can be positioned on the cross rail so that where the machine is used for a variety of work the spindles can be positioned to the most economical location of the jigs upon the table; thus the jigs can be made with the least angularity and the

least loss of space between them. The table casting is fitted to the central taper column of the base, and in addition is provided with an annular bearing close to the periphery of the table. The table is 84 in. in diameter and the depth from the annular bearing to the top of the table is 12 in. The least diameter of the taper fit between base column and table is 36 in. The table is provided with a finished hub 42 in. in diameter to assist in locating jigs on the table.

The cross rail and the central upright are in one piece, so as to reduce the number of bolted connections. The outer end of the cross rail is supported by a column which is bolted and doweled to the base as well as the cross rail.

Drive is by motor mounted on top of the machine and geared to a jack shaft. A box at the extreme outer end of the cross rail is used to transmit the motion from the jackshaft to the roughing and finishing spindles. This permits of a provision for varying the rotative speed of the spindles independently of each other, and for changing speeds when the grade of material or size of cutters is changed.

The rotative movement of the table is controlled by a fixed feed, which is predetermined, but this rate of rotation can be changed to suit any change in the grade of material. The operator, however, cannot increase or decrease the production of the machine as the rotative speed has been predetermined, which means that a given number of stations per hour must pass the loading station. The table is rotated by a herring. bone gear 81 in. in diameter. Each of the spindles is provided with an individual adjustment for setting the cutters to gages.

Different sizes of housings providing varying centers between the roughing spindles are used, depending upon the dimension of the work. Generally, however, these centers are either 12 in. or 14 in. Both spindles are rotated inward or clockwise on the left-hand spindle and counter clockwise on the right-hand spindle.

With the distance of 42 in. from the center of the roughing cutters to the center of the finishing cutters, it is pointed out that the roughing operation has been performed on a given casting before the finishing operation commences, hence the finishing cutter is relieved of any influence on the part of the roughing operation and due to the slight cut taken by the finishing cutter, any inaccuracy resulting from either dull roughing cutters or inequality of castings is picked up by the finishing cutter, thus to insure accuracy of both finish and dimension; also by the division of the work, the number of grindings of cutters is reduced. The principle of roughing and finishing cuts, it is explained, permits of operating at much higher cutting speeds and table feeds than is practical by any other process of surfacing operations.

All bearings, except the spindle bearings, are oiled

by the cascade method of lubrication.

What Is Tank Steel?

Tank steel has been defined by a committee of the Association of American Steel Manufacturers "as a grade to be used for ordinary fabrications or for structural purposes where no particular stresses are required. It should be free from injurious surface defects." The necessity for making a definition seems to have arisen through the fact that an increasing number of buyers were specifying tank steel and then adding requirements that would throw the material into a higher classification, without of course expecting to pay

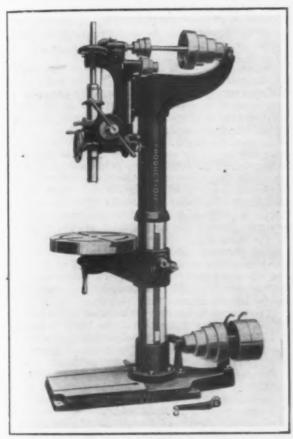


extras required by such higher classification. The ruling of the committee is further that if the buyers' specifications stipulate a tensile test from each plate as rolled, the material shall be classified as flange steel. Further, that if a flange steel purchase specifies a homogeneity test in addition to naming chemical and physical properties, the material becomes firebox steel. Further, that if the steel plate order carries specifications with regard to phosphorus and sulphur limits equivalent to the firebox grade, the steel shall be regarded as firebox steel unless the chemical tests are modified.

New 22-In. Upright Drill

A 22-in. upright drill with stationary head and bronze bushed throughout has been developed and placed on the market by the Production Machine Tool Co., Cincinnati. It is built to drill, bore, tap and face holes up to 1½ in. in diameter. The drill is regularly built with power feed, but this feature can be omitted if not required. Back gears and a tapping attachment can be added and either regular tight and loose pulley, right angle or belted or geared motor drive is furnished. Interchangeability of parts is emphasized as a feature.

Table elevating is by rack and pinion with worm. The table elevating worm is on the right hand side within convenient reach of the clamp for the table arm.



All Bearings in This Upright Drill Are of Bronze, Bush Type, Thus to Prolong the Life of the Bearings and to Enable Quick Replacement When necessary

The table arm is of box construction, in one casting, eliminating a cap or splitting in two sections, and is provided with a clamp for the table.

The head is of box type with spindle driving gear bearing and head cast integral, permitting spindle bearings to be bored and reamed at one setting, thus giving a more accurate alignment to the spindle. Drive is by tight and loose pulley through driving cones. The driving bevel gears have a peripheral speed of less than 800 ft. per min., thus to make for quiet running. Four spindle speeds from 20 to 88 r.p.m. are obtainable on the plain machine with four additional speeds from 117 to 530 r.p.m. through back gears, all in geometric progression. The back gears are of the sliding type engaging by a positive clutch operated simultaneously. These gears do not revolve when not in use.

These gears do not revolve when not in use.

Power feed is by feed cones transmitting through the upper worm and worm wheel and connecting shaft to lower worm and worm wheel which are standard 29 deg. angle. An adjustment is provided for the worm and also a trip to automatically throw out the feed. A positive clutch disengages the power feed members when the hand feed is used. A lever for quick return is regularly furnished. A ratchet feed hand lever can be furnished either in connection with or without power feed. The spindle is counterbalanced by a weight inclosed in the column. The spindle sleeve is graduated in sixteenths to 10 in. permitting the automatic stop collar to trip at the desired depth.

Rust Remover and Cleanser

A preparation marketed under the trade name "Meno," for removing rust, corrosion, etc., from machines, tools, parts and metal surfaces in general, is being distributed by Peter A. Frasse & Co., 417 Canal Street, New York. It is explained as a blending of chemical ingredients, which in combination produce an electro-chemical action that loosens and dissolves rust, corrosior grease, paint or other foreign substance adhering to the metal irrespective of its age or hardness; also that its action automatically ceases when contact beween the cleanser and the metal is established. The preparation is applied with a brush or is used in a vat, tank, or container with water into which the machine or parts are hung.

Cutting a 44-In. Steel Riser

An application of the oxy-acetylene torch for cutting a 44-in. square steel riser is shown in the accompanying illustration, which was taken in the plant of the National Car Coupler Co., Attica, Ind. The cut was rendered more difficult because of the upright position of the riser, which necessitated a horizontal cut. If the riser had been horizontal and the cut vertical the operation would have been much simplified. To offset this difficulty the operator resorted to first cutting the corners of the riser so as to reduce the uncut cross section to a smaller square. This operation was repeated until the remaining stem could be easily cut through. An Oxweld cutting blowpipe was used.



The Operator Is Cutting the Corners of the 44-In. Steel Riser so as to Reduce the Uncut Cross Section to a Smaller Square. This operation is then repeated until the section is cut through

In this manner it would appear that there is no limit to the thickness of steel that can be cut, as the operation of slicing off angles can be carried to any desired extent so long as access to the metal with the cutting flame is provided. With the injector type of blowpipe used, the "reach" of the flame enabled the operator in this instance to carry out the work by directing the jet through the initial kerf.

The Phoenix Tube Co., 182 North Eleventh Street, Brooklyn, is moving its brass-tubing plant to Warren, Ohio, but will continue to maintain a warehouse in Long Island City, N. Y., to take care of Eastern trade. The company's product is used chiefly in the manufacture of brass beds.

Interesting Facts About the American Foundrymen's Association

Some interesting observations on the recent convention of the American Foundrymen's Association at Columbus, Ohio, were made by C. S. Koch, the retiring president of the organization, at the October meeting of the Pittsburgh Foundrymen's Association at Hotel Chatham, Pittsburgh, on the evening of October 18. He said that the cost of wiring the inside of the several buildings used for the convention, exclusive of the cost of bringing power to the buildings and the installation of the transformer, was over \$8,000. He said that 76,000 ft. of space had been rented to exhibitors which was about 25 per cent more than was rented at the Philadelphia convention in 1919 and compared with 32,000 ft. of rented space at the convention of nine years ago held in Pittsburgh. He drew attention to the fact that the price of space for exhibiting purposes was less than half what ordinarily was charged at conventions and exhibitions of other industries. The registration was 4200, this being a gain of about 600 over the best previous record. Referring to the endowment fund for the awarding of prizes for meritorious effort in various lines of foundry practice, Mr. Koch pointed out that it was done without active solicitation. The American Foundrymen's Association has, in the past year, made a net gain in membership of 49.8 per cent, which Mr. Koch thought remarkable in view of the fact that the organization is not a new one.

Recent additions to the membership roll of the Pittsburgh Foundrymen's Association include the following: Gallagher Clawson & Hellman, Bolivar, Pa.; Connellsville Foundry Machine & Steel Castings Co., Connellsville, Pa.; Iron Age Publishing Co.; Bacharach Industrial Instrument Co., Pittsburgh; Dr. S. Troop, combustion engineer, Pittsburgh; W. C. Buske, master mechanic, the McConway & Torley Co., Pittsburgh; J. A. Snyder, Duquesne Reduction Co., Pittsburgh; George J. Hagan Co., Pittsburgh; Robert L. Collingwood, Pittsburgh, and W. M. McConnaughty armor plate department, Homestead Works, Carnegie Steel Co.

Commercial Drop Forge Co. Organized

W. Treat Davidson, formerly purchasing agent of the Struthers-Wells Co., Warren, Pa., and at one time chief engineer of the Hammond Iron Works, Warren, Pa.; F. B. Bielaski, formerly sales representative in northwestern Pennsylvania for several of the United States Steel Corporation subsidiaries, and Lewis C. Jamieson, formerly secretary and treasurer of the Clarendon Refining Co., Clarendon, Pa., have organized the Commercial Drop Forge Co., Warren, Pa., with a capital of \$240,000, for which application for a charter has been made. The company already has its plant under construction and plans to have it in operation about Feb. 1. It will make a general line of drop forgings and do custom work, especially for oil well supply houses, marine hardware, railroads and some automobile work. The company also plans to manufacture arch bars. C. R. Rogers, Corry, Pa., has the contract for the construction of the plant, which will include a forge plant 66×140 ft., with combination boiler house and die shop 40×80 ft. The latter building ultimately will be used exclusively for a boiler house. The site consists of about four acres, near the plant of the Warren Gear Products Co., on the River division of the Pennsylvania Railroad. The company will require several hammers, with drops ranging from 1500 lb. to 5000 lb., the necessary trimming presses and other equipment to complete a well-balanced plant.

Improvement in Railroad Service

Washington, Oct. 26.—Reports of the Bureau of Statistics of the Interstate Commerce Commission relative to various factors measuring the efficiency of railroads in the movement of freight traffic, train loading and car performance show a marked improvement in the first seven months of 1920 as compared with the same period of 1919. The effect of the report is to indicate a decided increase in efficiency during the months

of private control of the railroads as compared with the period of Federal control. During five of the seven months of 1920 the roads were under private control

The report states that the average of 769 net tons per freight train mile established in July, 1920, not only exceeds the train load in any month since the Government relinquished control, but, according to the statistics compiled by the Railroad Administration is greater than in any month under Federal control. Every region reports an increase in car load, the regions as a whole showing an increase over July last year of 6.1 per cent.

The carload average of 29.7 tons in July is almost equal to the 30 tons per car which was fixed by the railway executives as the ideal which the roads should strive to attain.

B. & O. R. R. Co. Asks Authority to Expend \$13,000,000 for Rolling Stock

Washington, Oct. 26.—Purchase of equipment by the Baltimore & Ohio Railroad will be made possible under an application for a loan and for approval of its participation in first equipment trust of the National Railway Service Corporation. The railroad has applied to the Interstate Commerce Commission for approval of its participation to the extent of \$13,000,000 in the equipment trust, for authority to issue conditional notes in the sum of \$13,000,000, for permission to indorse or guarantee the notes of the National Railway Service Corporation which will be given for loans from the \$300,000,000 revolving fund of the Government, for authority to pledge \$3,250,000 of its refunding and general mortgage bonds, and for a loan of \$5,200,000 from the revolving fund.

The Baltimore & Ohio plans to buy freight cars and locomotives at an approximate cost of \$14,000,000, and will pay \$1,000,000 in cash. Purchases will include 2200 hopper cars, 1000 box cars, 500 refrigerator cars, and 50 Mikado locomotives.

The Interstate Commerce Commission has authorized the Maine Central Railroad to issue bonds to the extent of \$3,619,000 to pledge for loans from the Government and from private sources. The company plans to buy new equipment and make improvements.

The commission has approved a loan of \$300,000 to the Central New England Railway Co., and \$200,000 to the Chicago, Indianapolis & Louisville Railway Co. The former plans to make additions and betterments at an estimated cost of \$500,000, while the latter will construct a modern steel car repair shop at LaFayette, and

Labor Leaders Sentenced

William A. Wallace and Charles Whitcomb were sentenced by Judge A. B. Anderson of the Federal Court at Indianapolis to 60 and 90 days respectively in the county jail after pleas of guilty to charges of contempt of court in violating an injunction in connection with labor trouble at the Hincher Mfg. Co.'s plant at Washington, Ind., in a case where a New York firm sought to compel the company to fulfill its contract for the delivery of goods. The court explained that the rights of laboring men and the right to strike were not involved, but that the only question was whether former employees of a company have a right to interfere with the fulfillment of contract entered into by that company. Whitcomb is president of the Central Labor Union at Washington and Wallace a member of it.

The property of the Progressive Metal & Refining Co., 432 Barclay Street, Milwaukee, was bid in for \$87,750 by Allen P. Firestone of St. Paul, Minn., at public auction. The sale price is 19 per cent in excess of the appraised value, namely, \$74,010.55, fixed by the Bankruptcy Court.

The American Pneumatic Chuck Co., Arcade Building, Pullman, Ill., announces that the following new officers have been elected: President, J. A. Olson; vice-president, A. G. Jacobson; secretary and treasurer, C. Teninga.

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ESTABLISHED 1855

THE IRON AGE

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Steel Price Tendencies

Informal exchanges of views on the steel market are a great feature of American Iron and Steel Institute meetings, and with more than 1500 members present last week's meeting in New York was the clearing house for an unusual volume of opinion. It was the view of many that merchant pig iron prices and the finished steel prices of independent producers will go lower; that no active market is to be looked for this year, perhaps not in January or February; that while mill operations may be curtailed further and unemployment may increase, there need be no apprehension of serious consequences, and that while in some lines price reductions might be overdone and were likely to be, the demand in time would be such as to cause an upturn through the dipping of active capacity below the line of consumption.

Judge Gary in his address made no such definite summation as the above. Those who expected him to go into particulars did not remember well his habit, as shown in the seventeen presidential papers of previous meetings. Speaking as president of the Institute and not as chairman of the Steel Corporation he was not likely to outline the corporation's future price policy, as certain financial oracles in the southern extremity of Manhattan Island seemed to expect.

When he said, referring to steel prices, that "as a matter of course some adjustments will need to be made," Judge Gary added that "the average of the general scale ought to be reduced equitably and relatively." This was naturally interpreted as pointing to further reductions in the prices of independent producers and as not precluding some advances by the Steel Corporation. It has been rather too readily assumed in some quarters that the Steel Corporation would be able to make a number of advances should it decide to do so. There is not much doubt that it could maintain an advance in rails, for rails are produced by but few mills and standard section rails are the one important product in all the list which is bought exclusively by railroads. To advance the rail price would be simply asking the railroads to compensate makers in part for the 40 per cent freight advance the roads had just made on the raw materials entering into rails and the other products of steel works.

However, when it comes to the general run of heavy steel products—plates, shapes and bars in particular—various lines of manufacture are involved as consumers, and the Steel Corporation has a larger number of competitors than in rails. The question is plainly one of capacity to produce and of consumptive demand. So far as the general price policy of the corporation is concerned, no change has been made and, unless we except rails, no change in the near future seems probable. If the demand in the first half of 1921 should be only enough to keep 75 per cent of the steel works capacity at work, it would not be safe to predict that even the present Steel Corporation price level would be maintained.

On the other hand, the possibility that the general market may break through the schedule of March 21, 1919, before the situation is stabilized following the present decline, is hedged up by several important considerations. One is that since the Gary dinner régime, quiet periods in the steel trade, like that of early 1915, have not been marked by a scramble of large works for all the business, other plants meanwhile shutting down. Competition has been keen in some cases, but there has been, without any concert, a certain adjustment of operations to the situation. In the first half of 1915 most companies ran at 60 to 70 per cent of capacity.

Another consideration is that the bulk of the finished steel bought is covered by contracts which most buyers renew from time to time with the mills from which they have been accustomed to buy. One steel company may get a larger share of a certain contract at one time than another, but deep price cuts to transfer a buyer's business from one mill to another are not common. The wholesome fear of reprisal in such a case is a strong stabilizing influence and there is a liveand-let-live spirit in the trade, notably in times

of diminished buying, that will be a check on declines.

Scarcity of steel dominated the market from November, 1919, to September, 1920. The price readjustment now under way will cover a period in which the supply is likely to be more than ample for the country's needs and those of foreign buyers. At the same time there are indications that the volume of business will require a large operation of iron and steel works, measured by pre-war standards, and therefore that the leaders in the industry, backed by their large average earnings of the past four years, will be well able. as Judge Gary urged, to "stand solid as against panic or lack of confidence in the industrial situation." The question of the precise level on which the present dual standard of prices will be adjusted may not be settled at once, but the steadying influences existing in the steel trade itself must be regarded as factors of high importance.

Property and Commodity Values

When the preaching began, soon after the armistice, that a return to "pre-war prices" for commodities was impossible because currencies and credits had been so greatly increased, resulting in a great decrease in the value of the dollar, an objection to the theory was that the great mass of real wealth in the country remained as it had been. This wealth, particularly that part of it represented by bonds payable in gold or equivalent, would necessarily tend to act as a counterpoise.

Now that commodity prices have been declining for some time, with prospects of further declines, the influence of property values is more apparent. Take dwelling houses for illustration. If the cost of building were tripled for all the future, then the value, expressed in dollars, of existing buildings could reasonably be expected to triple also. No such development has occurred. There have been some great increases in values, but the increases have been far from uniform in different sections of the country, whereas the rise in the cost of building was relatively uniform.

A curious fallacy gained ground in some quarters, that since everything had gone up, interest rates were entitled also to go up. Obviously there was no proper comparison, for the interest rate is a proportion, not a value. One might as well urge that as everything had gone up a man should spend a larger percentage of his day's income on his noonday luncheon than formerly. The particular bearing of this curious notion upon the value of property is that if there were an increase in the annual percentage return to which wealth is entitled, the change would write a depreciation on the value of property, other things being equal. If a property is worth \$100,-000 and yields a net return of \$6,000 annually, there is a 6 per cent investment. If the return remains at \$6,000 and capital is worth 8 per cent, then the value of the property is reduced from \$100,000 to \$75,000, as \$6,000 is 8 per cent return on \$75,000.

Even should commodity prices reach a stable

level in the near future, property values in keeping cannot be established until a Federal taxing system having some promise of permanence is established. Assuming for argument that the dollar is now worth only 50 cents, and that this applies equally to commodities and to property, then a property that was worth \$100,000 on March 1, 1913, and has the same intrinsic or relative value now that it had then, is now worth, merely in dollars, \$200,000, but the seller has to pay an income tax on \$100,000, and really loses that amount. The amount lost depends on the seller's income. If on March 1, 1913, two men each owned a property worth \$100,000, one of the men having nothing else and the other being a man of large income, the latter cannot afford to sell his property to-day at as low a price as the former, yet the buyer is indifferent as to which property he secures. Thus the tax law prevents free play in the establishment of property values by actual transactions. By the same principle, the bonds of a new enterprise are more attractive to the man with a small income than to the man with a large income. That is contrary to common sense and hampers development. No national problem is more urgent than that of establishing a sensible taxation system for the Government. Business cannot proceed freely and with confidence until there is an opportunity for property values to find a natural level, which of necessity must be one that is promised a degree of permanence.

Iron and Steel Price Alignments

In the readjustment in iron and steel prices now under way a condition that has been more or less absent for five years will be restored, a natural alignment of prices. Due to recurrent spells of prices dropping to an intimate relation with production costs, the general alignment of the schedule before the war reflected with considerable accuracy the cost of manufacture. It seems strange that at no time in the past five years have prices of the various commodities making up the iron and steel market been calibrated afresh with production costs.

In the rise of prices in 1915-6-7 prices retained something like their old relations to each other, but chiefly from force of habit. The price of a given commodity would rise by reason of demand, and the price of a related commodity would advance "in sympathy," there being no consulting of production costs, because that was unnecessary.

In the Government price fixing that began in September, 1917, there was an effort to relate the prices to the cost of production, and the plan was well carried out, but the peculiar exigencies of the case necessitated some departures. For instance, the authorities at Washington took particular interest in wire nails, with the result that nails were set somewhat low in relation to other steel products. On tin plate, on the other hand, a liberal price was set because so much food was at stake. Then, again, a principle that had practically faded out of the market was restored—that it should be financially possible to make

finished products from the semi-finished material—and accordingly the percentage spreads were widened.

In the price readjustment of December, 1918, an effort was made to correct some recognized inequalities, as, for instance, by excepting rods and nails from the reductions. The Industrial Board reductions were particularly mechanical in character, for the reductions in finished products were simply as follows: Grooved steel skelp and wire products, \$5 per net ton; everything else, \$7 per net ton.

Even if the Industrial Board adjustments had been made with close reference to costs and conditions as to demand, the fact would remain that great changes have occurred since that time. Cost relations are materially altered, and new alignments have developed between demand and capacity. Demand relative to productive capacity is much greater in merchant bars than in plates, for instance. The frequent references in the past few weeks to the likelihood of the steel market establishing itself as a whole on the basis of the prices the Steel Corporation has maintained have given little weight to these facts.

Beyond the matter of price relations between steel products there is the broader aspect of the iron and steel market in general, involving relations between coke and pig iron and pig iron and semi-finished steel. When Connellsville coke was selling at \$17 to \$18 per ton, it was at eight times its ten-year pre-war average. Pig iron at \$50 was three times its pre-war average, while the Industrial Board price on billets was only 55 per cent, and the highest open market price this year was only 180 per cent above the pre-war average.

Neither the pre-war averages nor the prices lately obtaining will control the alignments in the new price schedule that is to be established. The whole structure is to be remade. On account of the dependence of one product upon another the process will require time. The iron and steel market is not merely willing, but rather is anxious, to develop a stable price structure; but adjustments of fundamental character have to be made, and one branch of the market will have to wait on another. The market must even wait upon something that is entirely outside, the coal market, for coke cannot find its proper level until coal has found itself.

A summary of the formal price changes made from the war control prices may be appended. The adjustment of December, 1918, reduced slabs, standard and small billets and sheet bars \$4 a ton, left rods unchanged, reduced bars, shapes and galvanized sheets \$4 a net ton, plates \$5, pipe and black sheets \$6, blue annealed sheets \$7 and tin plate \$8, and left wire products unchanged. The Industrial Board adjustment of March 21, 1919, reduced slabs, billets, sheet bars and rods \$5 a ton, wire products \$5 a net ton and bars, shapes, plates, pipe, sheets and tin plate \$7.

There was a surprising drop in British iron and steel exports in August. All products suffered, but the chief declines were in pig iron, rails, bars and galvanized sheets. The total fell from 393,016 gross tons in July to 276,083 tons in August, or to the fifth place in rank for the year. This brings exports for the eight months of 1920 to 287,156 tons per month, or 70 per cent of the pre-war record of 420,000 tons per month in 1913, In marked contrast is the movement from the United States. In August our iron and steel exports were 431,484 tons, or next to the largest for the year. The May, June, July and August totals each exceeded 400,000 tons and the average for these four months was 428,354 tons, or in excess of Great Britain's 1913 record. For 1920 to Sept. 1 the American average of 359,944 tons per month is 25 per cent greater than the British average of 287,156 tons. The record of both countries is remarkable in view of internal conditions, but the present coal and labor situation in Great Britain will cause a further setback there, doubtless with some temporary gain to the United States.

Progress in Basic Steel

The technical sessions of the American Iron and Steel Institute last week were featured by two important papers on basic open-hearth steel making. That by F. L. Toy, the third in a series of papers on the open-hearth process, is a voluminous discussion of vital phases of this subject. Despite the improvements that have been made, the author finds "a definite belief among thoughtful open-hearth men that much can be done toward future improvement and that the possibilities are fully as great as ever. The basic openhearth process embodies a great principle which for many years may find application in our steelmaking processes, although, through instruments and methods of which we as yet have no conception or knowledge, we have not yet the vision that lets us see them in terms of their ultimate economic value to us."

The basic is the most complicated of the steel-making processes, involving as it does so many chemical reactions. Its use is growing the world over. It now contributes about 80 per cent of the American open-hearth steel output and its use in England has advanced strikingly in recent years. As a result the quality of basic open-hearth has improved until there are those who claim that it can be made or is produced equal to acid open-hearth steel.

The other paper deals ably with the use of high manganese pig iron in the basic open-hearth process. An abstract appears elsewhere. Mr. Wheaton clearly shows the progress in this comparatively new development. The benefits set down, from the blast furnace practice down through the open-hearth to the savings in the rolling of finished products, are highly important and will commend themselves to such as have not yet appreciated the possibilities.

Without doubt still greater developments in the matters presented by the two papers are in store for steelmakers. It has been demonstrated that the basic electric furnace, in duplexing or triplexing, accomplishes the same results as the more complicated and longer reactions of the basic open-hearth, with or without manganese, and probably better results. Is it not likely that when, in the course of time, the super-power projects are realized over the country and electricity is obtained from water powers on a greater and cheaper scale, large unit electric furnaces will refine hot metal from the converter or the open-hearth, or from the mixer direct, into high quality steel on a scale beyond anything regarded as practical to-day?

President Campbell's Advice to Employees

In advising employees of the Youngstown Sheet & Tube Co., Youngstown, Ohio, of the plan to sell stock on a deferred payment basis, President James A. Campbell stated:

"As president of this company, being familiar with its ore, coal and limestone properties and believing that our plant can convert these materials into finished products as cheaply as the average plant, and knowing that we have the good-will of a large number of customers, I do not hesitate to strongly recommend that all of our employees and the employees of our subsidiary companies subscribe to the full amount of their ability to pay for it, and hold it to the end of the five-year period in order to secure the benefit of the bonus. I am quite sure at the price fixed they can secure a safe investment at very much less than the actual value.

"The present book value of the stock, at cost of our plant and raw material properties, such as coal, ore and limestone, is \$100 a share; and if these properties were written up to their present replacement value, we believe they would show twice the amount at which they stand on our stock books."

The stock is being offered to employees of the company, and its subsidiaries, the Buckeye Coal Co., the Buckeye Land Co. and the Continental Supply Co., at \$85 per share.

Slight Increase in Employees

Washington, Oct. 26.—Employees on the payrolls of 98 iron and steel plants increased 2.3 per cent in September as compared with August, according to figures of the Bureau of Labor Statistics. The amount of the payrolls increased 6.3 per cent.

In August the number of employees in these establishments totaled 180,564, while in September the total was 184,805. The amount of the payroll increased from \$13,536,181 in August to \$14,392,181 in September.

In the automobile industry there was a decrease of 4.5 per cent in the number of employees and 3.2 per cent in the amount of the payroll. The number of employees in 46 automobile establishments in August was 120,624 and in September 115,353. The amount of the payroll decreased from \$4,168,330 in August to \$4,035,-193 in September.

Out of 14 industries four industries only showed an increase in the number of persons on the payroll in September as compared with August. The other ten showed a decrease. Four industries also showed decreases in the amount of money paid employees.

The final hearing on the selection of a route for a barge canal from the Great Lakes to the Ohio River will be held at Cincinnati, Oct. 29, before the Board of United States Engineers comprised of Colonels W. V. Judson, W. W. Harts and Edward M. Markham. The board on the same day will make an inspection of the proposed terminal for the canal, and on Oct. 30 will make a tour of the Millcreek Valley and the Big Miami Valley as far north as Dayton.

The Louisville Sheet Steel Co., Louisville, Ohio, expects to place its new plant in operation early in November. Its principal product will be galvanized sheets.

CORRESPONDENCE

Die Casting of Aluminum Bronze

To the Editor:—In your issue of Oct. 21, page 1052, we find a report on a paper read at the Foundrymen's convention by Mr. Pack in relation to die castings. He makes the assertion that the casting of brasses and bronzes in metal molds is an impossibility and not being done practically at the present time.

We believe it will be of interest to you and your readers to know that the Buffalo Bronze Die Cast Corporation is casting aluminum bronze, 90 per cent copper, 10 per cent aluminum, in metal dies and has been doing so for three years.

The smallest pieces we have run weigh 360 to the pound and the largest piece 12 lb. We have cast an outside thread on a casting made in two pieces which when assembled had to be in perfect alignment. The thread was 20 pitch. We have run a die well past the 35,000 mark. We have accomplished the coring of holes, with metal cores, to a degree of accuracy of plus or minus one-half thousandths of an inch on holes ½ in. in diameter and as deep as 1½ in.; on casting of teeth on bevel gears as large as 4 in. in diameter to a degree of accuracy on tooth parts of plus or minus one-thousandth. We have been commercially casting teeth in worm gears in metal dies for two years. Our deliveries on this piece have run as high as 500 per day. The gear weighs 12 lb.

day. The gear weighs 12 lb.

We feel, because of the conditions under which this paper was read, that in justice to the audience and your readers, that we should make known the truth of the matter.

THOMAS W. H. JEACOCK, President,

Buffalo Bronze Die Cast Corporation.

Buffalo, N. Y., Oct. 22, 1920.

The Iron Age and Its Readers

A 54-year-old copy of The Iron Age, published Thursday, Nov. 1, 1866, was brought to us last week by a friend who discovered it among some accumulated possessions. "General business is very dull," says the trade report of the week, "more sluggish even than last week, in some departments."

No. 1 American pig iron is reported "scarce for early delivery, with sales at \$50 a \$51 cash; No. 2 extra, \$46 a \$47; No. 2, \$43 a \$44 cash." Other quotations are: Rails, English, \$52 a \$53 gold; old rails, demand good at \$50 cash; wrought scrap iron at \$55 a \$57 cash; good demand. Spelter was 6½c. gold for whole lots; 9%c. to 10c. currency; lead, 6%c. gold; ingot copper, 31c. for Detroit Lake and 30%c. for Portage Lake and Baltimore; tin, Straits and English, 21c. to 21½c; Banca, 24c., gold.

It is interesting to note that the Cambria Iron Co., Johnstown, Pa., presented a persuasive argument that by reason of "doing their own machine work and repairs, they produced rails of an unsurpassed excellence of quality at the lowest market rates." Jones & Laughlins, operating the American Iron Works, advertised "bar, plate and sheet iron, nails, ship and railroad spikes, railroad splice bars and bolts, car wheels and axles, celebrated cold rolled shafting, piston rods, etc." Winslow, Griswold & Holley, at Troy, declaimed on "the great strength and toughness and perfect homogeneity of the Bessemer or pneumatic cast steel." I. Washburn & Moen Wire Works, Worcester; Sidney Shepard & Co., Buffalo, and the Waterbury Brass Co. were among the advertisers

ENGINEERING COUNCIL

Questions Considered in Chicago, Including Control of Public Works Department

"The principle of a Department of Public Works is thoroughly settled in the minds of the public and a majority of the members of Congress. The important question remaining is the kind of a department that we shall have. This involves a discussion of the matter of engineering control of the Government operations. Shall it be civil or military?" This query was made by M. O. Leighton, Washington office, Engineering Council, in a report to that body read at a meeting at the rooms of the Western Society of Engineers, Chicago, on Oct. 21.

Mr. Leighton called attention to the fact that agitation for the creation of a Department of Public Works was started by the engineers at a meeting in Chicago in April, 1919. For some unaccountable reason the enthusiasm of engineers has cooled and the movement has been taken up by other interests. National Education Association, the Woman Voter's League and the Federation of Women's Clubs, supporting a proposed department of education, the American Public Health Association and other organizations supporting a department of health, certain welfare organizations advocating a department of public welfare, the National Budget Committee and others propose to merge their efforts by organizing a federal reorganization council, which will be a common body through which an accepted program may be carried forward. At a meeting of delegates held in New York on Oct. 14, a program was proposed providing for a general rearrangement of Government activities along functional lines, including the creation of a department of public works by a reorganization of the present Interior Department, and an additional department to be called the department of education and health, into which would be drawn such welfare activities as war risk insurance, vocation and rehabilitation, pensions, etc. After discussion the idea of a national reorganization council was tentatively adopted and arrangements were made for a final organization to take place about Nov. 15. The prospective field of such a council is not limited to the mere reorganization of federal activities, Mr. Leighton said. It should, if properly conducted and supported, become the authoritative unofficial body to engage in the work which will eventually lead to a distinct separation of the political features of our governmental system from the conduct of departmental business.

When Mr. Leighton concluded his report a resolution was adopted by the council authorizing the chairman and the secretary to co-operate with the Washington representative in preparing and sending out an appeal to engineering societies soliciting their earnest moral support on behalf of a public works department manned by civilian engineers.

Relief for the Patent Office

What the Engineering Council had achieved in promoting legislation for the relief of the U.S. Patent Office was outlined in a report by Edwin J. Prindle, chairman of the patents committee. Mr. pointed out that owing to inadequate office and examining forces and low salaries the patent office had become so slow in functioning as to vitiate the value of many patents. Low compensation resulted in an annual loss through resignations of 25 per cent of the examining force, a condition making the issuance of defective patents unavoidable and thereby resulting in useless development of devices and expensive litigation. A suitable bill designed to remedy this situation passed the House of Representatives, but the bill which passed the Senate was amended in such a manner as to emasculate it. While Mr. Prindle has not lost hope of a restoration of the house bill in all its provisions in the conference committee, he urged that the Engineering Council appeal to the engineering societies to solicit the co-operation of their representatives in Congress to that end. A resolution was accordingly adopted by the council urging the engineering profession to use its influence in behalf of a restoration of the provisions of the House bill in the bill submitted to Congress by the conference committee.

Licensing Engineers and Architects

After considerable discussion following the report of the License Committee, T. L. Condron, chairman, the Engineering Council decided that whenever legislatures take action towards licensing engineers within the state, the bill prepared by the committee shall be recommended for passage. The bill provides that engineers, land surveyors and architects engaged in their professions in a state must be registered after an examination by a competent board.

Recommendations for Member of Shipping Board

A resolution was passed at the meeting recommending to the President the names of Prof. Henry E. Riggs, University of Michigan, and William H. Adams, consulting engineer, Detroit, as candidates for engineer member of the United States Shipping Board.

Final Meeting at Washington

The Chicago meeting was presided over by J. Parke Channing, chairman. The final meeting of the Engineering Council will be held on the third Thursday of December at Washington, D. C., when arrangements will be effected for the termination of the work of the council and the transfer of its functions to the American Engineering Council of the Federated American Engineering Societies.

Acceptance of A. S. M. E. Boiler Code

An additional number of states and cities have adopted or accepted as their boiler standard the American Society of Mechanical Engineers boiler code. It has now also been found that the code is being used as a text book in a number of different colleges and universities. A list of the 17 states and 11 cities using the code was given by Chairman Charles E. Gorton, of the administrative council of the American Uniform Boiler Law Society, in a report submitted by him at the annual meeting of the society at the Waldorf-Astoria Hotel, New York, Sept. 23. This list is here given, together with the interesting information of the formation of a new body concerned with the operation of the code.

One matter that came before the society during the year, said Mr. Gorton, was the advisability of organizing an association or board that would bring about three things—first, the uniform stamping of boilers; second, the uniform examination of inspectors; and third, uniform interpretation as applied to the states that have already adopted, or those that will adopt the code. On Dec. 2, 1919, the society, through its executive committee, was instrumental in organizing the National Board of Boiler and Pressure Vessel Inspectors. This National Board was organized for the purpose of promoting uniform boiler laws throughout the jurisdiction of the members of the organization; for the interchange of opinions, rulings and the approval of specific designs and appurtenances and devices used in connection with boilers and other pressure vessels; the uniform stamping of boilers and uniform examination of boiler inspectors. The membership is restricted to inspectors or other officials charged with the enforcement of rules and regulations in the states and municipalities which have adopted the A. S. M. E. boiler

Inquiries as to whether certain boilers, designs and specifications would meet code requirements are turned over to the national board through the boiler code com-

mittee's secretary.

The states and cities as well as Allegheny County, Pa., that have adopted or accepted the A. S. M. E. code are as follows: States: Rhode Island, New York, New Jersey, Pennsylvania, Missouri, Delaware, Maryland, Michigan, Ohio, Indiana, Wisconsin, Minnesota, California, Oregon, Utah, Oklahoma, Arkansas. Cities. Detroit, Erie, Pa., Kansas City, St. Louis, St. Joseph, Mo., Philadelphia, Nashville, Tenn., Chicago (will accept), Scranton, Pa., Memphis, Tenn. (will accept), Seattle.

Association Methods Before Supreme Court

Arguments in Case of American Hardwood Manufacturers' Association Submitted— Open Price Plan Discussed By Attorneys

Washington, Oct. 26.—Arguments have just taken place before the Supreme Court of the United States in a case of vital interest to many trade associations. The case is that of the American Hardwood Manufacturers' Association, legality of whose practices has been attacked by the Government under the Sherman anti-trust act. The case has reached the Supreme Court on an appeal from the district court of the western district of Tennessee which held the practices of the association to be in violation of the law. The case involves the legality of the practice of members of an industry interchanging with each other at regular intervals reports showing past sales and prices and stocks on hand, this practice being generally referred to as the "Open Competition Plan" or the "Open Price Plan."

Defendants in the present proceedings are corporations and individuals, members of the American Hardwood Manufacturers' Association, and the manager of statistics of the association.

Charges Were Sustained

The charges made against the hardwood lumber association and sustained by the lower court were that from January, 1919, down to the time of the filing of the bill, the defendants were engaged in a conspiracy to maintain and enhance the price of hardwood lumber, first by substituting agreements as to price in place of competition, and second, by curtailing production, and that the principal means employed to bring about such agreements as to price and such curtailment of production were "Stock Reports" and "Sales Reports" and "Production Reports," issued by the association.

Counsel for the lumber association before the Supreme Court were L. C. Boyle and G. Carroll Todd.

While arguments in the case related to the specific acts of the lumber association, the proceedings are being closely watched by members of organizations in other industries because of the bearing that a decision would have upon the practices of other trade associations. It is the expectation that the Department of Justice will at once proceed against a number of other organizations in case the lower court's decision in the lumber case is sustained by the Supreme Court.

Mr. Boyle in his argument before the court declared that the compilation and distribution of the stock reports, production reports, and sales reports was not an unlawful act. Therefore, he said, assuming such a conspiracy as was alleged, and that the reports were means of carrying it out, there was no warrant of law for prohibiting such reports absolutely as the decree does, but only as a means of carrying on the conspiracy.

Right to Associate

Relative to the right of members of industry to associate together for the purpose of reporting market conditions, Mr. Boyle said:

"The contention of the defendant is that they are within their lawful rights in associating for the purpose of furnishing each other with accurate information of the basic facts of the industry in which they are engaged, including stocks on hand, rate of production, and the prices at which the product has been sold, and that such association does not cease to be lawful merely because, informed by the knowledge so obtained, but without agreement, understanding or concert of action of any kind, the individual members may ask different prices, or produce at different rates, higher or lower as the case may be, than they would have done had they not been thus informed."

Mr. Boyle said that while these reports did not have anything to do with determining the price received for lumber in the extraordinary market of 19191920, when buyers were bidding against each other and sellers were getting whatever prices they wished to ask, it was undoubtedly true that the lumber men hoped through the knowledge of market conditions thus obtained to be able to get more for their lumber than if they had sold it without accurate information in that regard, as most of them formerly did. Continuing along this line Mr. Boyle said:

Market Conditions and Prices

"They did hope, however, by being informed of the conditions of supply and demand, to be able to obtain for their lumber what those conditions determined it to be worth at any given time. That might be more at one time, and less at another, than they would have got had they made their sales blindly in the old way. But of course the parties calculated that on the whole they would profit by having accurate knowledge of market conditions to guide them in the conduct of their business. There is no question about that.

"We dispute the proposition, however, that because accurate knowledge of market conditions may enable producers at times to realize higher prices, it is therefore unlawful to associate for the purpose of obtaining such knowledge.

"There is a vital difference between an agreement or association which has for its direct and immediate object the suppression of competition or the raising of prices, and one whose direct and immediate object is legitimate but which indirectly might result in higher

"Thus it is a common thing for producers of an article to associate for the purpose of enlarging the demand for it by advertising or otherwise making known new uses to which it can be put. No one questions the legality of such an association, since its direct or immediate object, namely, enlargement of demand, is legitimate, although expectation of higher prices in consequence of the greater demand was in the thoughts of the parties."

The Government's Contention

The Government's side of the case was presented by Henry S. Mitchell, acting assistant to the Attorney General. Mr. Mitchell told the court that it is the Government's contention that the defendants conspired together in agreeing to conduct their cooperative activities "with the purpose of suppressing competition, and maintaining and enhancing prices and in such manner as to effectuate that purpose."

"It is undisputed," said Mr. Mitchell, "that the defendants conspired together in that they agreed in becoming members of the so-called open competition plan, and, as such, in conducting meetings and oral discussions concerning past and future prices, stocks, and production, and in compiling and distributing among themselves the monthly and weekly reports and bulletins concerning prices, stocks, and productions, and the monthly answers to questionnaires, consisting essentially of predictions that prices would go higher."

Mr. Mitchell told the court that the contention of Mr. Boyle that there was no uniformity of prices was not responsive to any part of the Government's case, because the Government had conceded at the outset that disparity of prices existed among defendants.

Mr. Mitchell said that the suit was not brought until the membership of the organization had practically trebled within a year and the manager of statistics had declared that at the rate they were going they would soon embrace "practically every producing interest," and the efficiency of the plan in enhancing prices had been proclaimed by a large number of the defendants.

Iron and Steel Markets

NEW PRICE DECLINES

Coke \$4 Lower and Pig Iron \$2 to \$3

Independent Producers Make Further Concessions-Steel Corporation Basis Unchanged

With no increase in new business, the downward tendency of iron and steel prices has been more pronounced. In coke, which has been the key to high pig iron prices for months, the week has brought a further decline of \$4 a ton, making a total of \$6 in two weeks. Pig iron in turn is \$2 to \$3 lower and in billets and in several finished steel products, notably plates and bars, independent producers have come closer to the Steel Corporation's prices.

More mills have reduced output. Some of the lesser steel plants in the Pittsburgh and eastern Ohio districts have been more than 50 per cent idle and six blast furnaces in those districts have blown While the Youngstown plant of the Carnegie Steel Co. is operating but half its open-hearth furnaces, the company as a whole is running to 80 per cent of its steel capacity and 40 of its 59 blast furnaces are producing.

No change has been made in the Steel Corporation's price policy and any expectations of an advance by the corporation still center in rails, concerning which an announcement is looked for before the end of the year.

The unevenness in order books, with the passing of a "scarcity" market, has caused a sharp cut in prices here and there. At Pittsburgh one bar maker, in need of tonnage, took orders for several days at the Steel Corporation's price of 2.35c. and then went back to a minimum of 3c. On the Pacific Coast one seller went to 4.25c. for steel bars,

equivalent to 2.50c., Pittsburgh.

The week's sales of car material at Chicago include 13,000 tons of plates and shapes for the repair of 3000 New York Central cars and 7000 tons for new gondola cars for a coal company—all at 2.65c., Pittsburgh, for the plates and 2.45c. for the shapes. Some car inquiries have been withdrawn in the expectation of lower bids later. The Norfolk & Western is in the market for 1000 hopper

Rail bookings for 1921 point to an important increase over the rollings in either 1919 or 1920. Nearly all Western roads have arranged for next year's supply at prices to be fixed later, and some large reservations have been made in the East, including 100,000 tons for the Pennsylvania. Some independent mills will not agree to accept the Steel Corporation's rail price as finally fixed.

For 6000 tons of prompt plates just bought by the Standard Oil Co. from independent mills, 2.95c. and 3c., Pittsburgh, appear to have been paid.

Wrought pipe is an exception to the general market tendency, as inquiry is active on a fairly large scale, a pending contract for oil line pipe running up to 40,000 tons. An export inquiry is for upward of 300 miles of 8-in. and 10-in. pipe. Makers are quite well sold on oil country goods and

Following sales of basic pig iron amounting to 6500 tons at \$40, Mahoning and Shenango Valley furnace, a decline of \$3, prices of other grades in the Valleys have been correspondingly reduced and the price of basic in eastern Pennsylvania, determined by the Valley market, is down \$5. The price of No. 2 foundry iron in the South, long held at \$42, has been cut \$4 in a sale of 3000 tons by a Southern steel company not usually a seller of foundry iron. In Eastern territory, the few transactions recorded are confined almost entirely to resales at liberal concessions. Even the lowest quotations of the week are considered but temporary, as the rapid decline in coke is having its effect on pig iron and the general tendency is downward. Foundries, however, continue fairly active and are merely marketing iron bought in excess of probable requirements to make sure of deliveries.

Export sales have fallen off in a marked degree this month, the unfavorable credit situation creating an embargo against a growing list of coun-However, .figures for September and October are expected to show shipments up to the average of more than 400,000 tons for each of the

previous four months.

The 6000 tons of American rails reported from Buenos Aires to have been bought by the Argentine Government at \$73, delivered, may have been a resale Government lot, as no rail mill took this Domestic mills have been getting higher than \$60 seaboard (freight to Argentina being about \$13) on export rail business.

Europe's markets remain in line with events here. Stagnation and plant shutdowns mark the situation in Great Britain and prices are weaker. American exporters have been offered Belgian steel bars at 1,235 francs, or \$84, delivered in the

Argentine.

A noteworthy development calculated to help German exports is a material price reduction in finished and semi-finished products in Germany. The state-created Iron Industry Union has now put bar iron at 2,440 marks per ton, effective for four months from Nov. 1, against 2,840 marks in July and 3,620 marks in May. Pig iron is left as before, because exchange has increased the cost of imported ore.

Pittsburgh

PITTSBURGH, Oct. 26.

The readjustment of prices of iron and steel, and incidentally of fuel, has gained more headway in the The bottom appears to have dropped out past week. of the coke market, with the furnace grade off about \$4 a ton further and down about \$6 a ton from the high point of about two weeks ago. Declines running from \$2 to \$3 a ton have occurred in pig iron prices, and the lower figures do not appear to be anything more than a temporary resting place, as offerings, at least of the steel-making grade, have been made at even less money. The narrowing of the spread between the Steel Corporation's prices and those of the independent steel companies' continues, and while the separation still is a matter of \$46 per ton in galvanized sheets, it amounts to but \$4 per ton in plates, a goodsized sale of which is reported at 2.85c. While most of the independent makers of steel bars are holding at

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics
At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton: Oct. 26, Oct. 19, Sept. 1920		Sheets, Nails and Wire, Oct. 26, Oct. 19, Sept. 28, Oct. 28, 1920 1920 1920 1919
No. 2X, Philadelphia‡. \$51.54 \$53.5 No. 2, Valley furnace† \$45.00 47.00 47.00 No. 2 Southern, Cin'ti† \$46.50 46.50 No. 2, Birmingham, Ala,† \$42.00 \$42.00 \$42.00 No. 2 foundry, Chicago* \$43.00 \$43.00 \$46.00 Basic, del'd, eastern Pa. \$46.16 51.26 51.26 Basic, Valley furnace. \$40.00 \$43.00 \$48.50 Bessemer, Pittsburgh. \$46.96 \$48.96 50.4 Malleable, Chicago* \$43.00 \$46.50 \$46.50 Malleable, Valley. \$46.00 50.00 50.00 Gray forge, Pittsburgh. \$45.96 \$7.96 50.90 50.00	28.75 31.60 28.00 0 28.75 6 28.00 0 25.75 29.35 29.25 0 27.25	Per Lb. to Large Buyers: Cents Cents Cents Sheets, black, No. 28, P'gh. 6.50 6.75 7.00 4.25 Sheets, galv., No. 28, Pgh. 8.00 8.25 8.50 5.70 Sheets, blue an'l'd. 9&10. 4.90 5.00 5.25 3.55 Wire nails, Pittsburgh 4.25 4.25 4.25 3.50 Plain wire, Pittsburgh 3.75 3.75 3.75 3.85 Barbed wire, galv., P'gh. 4.45 4.45 4.45 4.25 Tin plate, 100-lb. box, P'gh. \$3.50 \$8.50 \$9.00 \$7.00
L. S. charcoal, Chicago 58.50 58.50 58.50 Ferromanganese, Atl. port. 155.00 170.00 170.0		Carwheels, Chicago
Rails, Billets, Etc., Per Gross Ton: Bess. rails, heavy at mill. \$55.00 \$55.00 \$55.00 \$-7.00	0 47.00 0 38.50 0 38.50 0 42.00 0 51.00 4 47.50	Heavy steel scrap, Phila. 22.00 23.00 24.00 20.00 Heavy steel scrap, Ch'go. 20.00 20.50 23.00 18.00 No. 1 cast, Philadelphia. 38.00 40.00 42.00 24.00 No. 1 cast, Philadelphia. 38.00 39.00 39.00 26.00 No. 1 cast, Ch'go (net ton) 26.00 28.00 32.00 25.50 No. 1 RR. wrot, Phila. 27.00 28.00 32.00 27.50 No. 1 RR. wrot, Ch'go (net) 19.00 20.00 22.50 19.50
Finished Iron and Steel,		Coke, Connellsville, Per Net Ton at Oven:
Per Lb. to Large Buyers: Cents Cents Cents Iron bars, Philadelphia. 4.85 4.85 4.85 Iron bars, Pittsburgh. 4.75 4.75 4.75 Iron bars, Chicago. 3.75 3.75 3.75 Steel bars, Pittsburgh. 3.00 3.00 3.2 Steel bars, New York. 3.38 3.63 4.1	2.995 2.75 2.72 2.50	Furnace coke, prompt. 311.00 \$15.50 \$16.50 \$5.50 Furnace coke, future. 12.00 14.00 14.00 6.00 Foundry coke, prompt. 13.00 16.50 17.50 7.00 Foundry coke, future. 13.00 14.00 14.00 6.50
Tank plates, Pittsburgh. 2.85 3.00 3.2 Tank plates, New York. 3.38 3.38 3.6 Beams, etc., Pittsburgh. 3.00 3.0 3.1	5 2.65 3 . 2.92	Metals, Per Lb, to Large Buyers: Cents Cents Cents Cents
Beams, etc., New York 3.48 3.48 3.4 Skelp, grooved steel, P'gh. 3.25 3.25 3.2 Skelp, sheared steel, P'gh. 3.50 3.50 3.5 Steel hoops, Pittsburgh 5.00 5.00 5.5	8 2.72 5 2.45 0 2.65	Lake copper, New York 15.25 16.00 18.50 22.25 Electrofytic copper, N. Y 15.25 16.00 18.50 21.75 Spelter, St. Louis 7.10 7.25 7.70 7.75 Spelter, New York 7.50 7.50 7.70 8.10
*The average switching charge for delivery to in the Chicago district is 70c. per ton. †Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.		Lead, St. Louis. 6.75 7.00 7.75 6.50 Lead, New York 7.00 7.25 7.75 6.75 Tin, New York 40.25 38.25 43.50 56.75 Antimony (Asiatic), N.Y. 6.50 6.50 7.12½ 8.75
The prices in the above table are for domest	ic delivery a	nd do not necessarily apply to export business.

3c. to 3.25c., one company for a few days took business at the Steel Corporation figure, 2.35c. This company since has gone back to a quotation of 3c. minimum, and the acceptance of the low price business is explained by the disruption of its mill schedule through cancellations and suspensions and a desire for business to absorb increased production. In keeping with the downward slant of iron and steel prices, sharp declines also have been registered in the scrap market.

The week has been marked by a recurrence of a marked shortage of open top cars and some companies, notably the National Tube Co. and the American Sheet & Tin Plate Co., have suffered rather severely from this development. The National Tube Co. and the Carnegie Steel Co. have actually been obliged to stock considerable tonnage and the American Sheet & Tin Plate Co. has barely been able to make shipments equal to production even though the latter has been affected by a shortage of steel. Those manufacturers who ship largely in box cars have not been affected and the general expectation is that the dearth of open-top equipment is in a fair way of early relief. This expectation is predicated upon the possible repeal of Interstate Commerce Commission orders Nos. 10 and 20, within the next two weeks. Order No. 10 refers to coal priorities on lake shipments, and order No. 20 describes the limitations of open-top cars that must be used exclusively for coal shipments. It seems that the lake requirements already are almost satisfied and it is figured that within the next 10 days or two weeks car priorities for shipments in that direction will be shut off. This development is expected to be followed by a repeal of the orders and the releasing of a large number of cars for steel mill and general service.

Further curtailment of operations is noted. The en-

tire steel works department of Pittsburgh Crucible Steel Co., Midland, Pa., is down, as is also that of the American Steel Foundries at Sharon, Pa., and the Savage Arms Co. at Sharon. The Sharon Steel Hoop Co. is operating about 50 per cent of its steel-making capacity at Sharon, Pa., and at Lowellville, Ohio. The Ohio works of the Carnegie Steel Co. has only half of the open-hearth furnaces in operation, but as a whole this company is running 80 per cent of its steel works capacity, and has 40 of its 59 blast furnaces in blast. The Youngstown Sheet & Tube Co. and the Republic Iron & Steel Co. are running 100 per cent in their open-hearth departments, but each has put upon the idle list one blast fur-nace. The Brier Hill Steel Co. also has blown out a blast furnace, but is running full in its steel working department. No. 4 furnace of the Shenango Furnace Co. has been blown out since a week ago and the Josephine, Pa., furnaces of the McKinney Steel Co. and of the Perry Iron Co., Erie, Pa., are recent additions to the inactive list.

The attempt of the Ford Motor Co. to secure revisions of high priced contracts in keeping with the cut that was announced several weeks ago in the price of its cars has failed as far as the independent manufacturers of sheets are concerned, and has not been entirely successful in other directions. The statement given out by the purchasing department of the Ford Motor Co. is discredited by sheet manufacturers, so far as sheets are concerned.

Pig Iron.—The market on basic iron has become clearly defined since a week ago by sales aggregating 6500 tons for delivery over the remainder of the year, at \$40 from a Valley furnace. A Valley steel maker took over 1000 tons, the remainder going to a Pittsburgh district melter. This business represents a de-

cline of \$3 per ton from the previous quotation and has been followed by a revision downward of all other grades of pig iron. Bessemer iron now is quotable at \$45 from Valley furnaces and while only small sales have taken place at that figure, there is no question that additional tonnages could be bought at that price and possibly for less. The price of \$40 for basic iron also can be shaded, at least, consumers claim to have recently had offers of tonnages carrying a price of \$38.50 from Valley furnaces. Small sales of foundry iron have taken place at \$47, but the bulk of the tonnage moved has carried a price of \$45 and this price could be repeated. One lot of 200 tons of No. 2 foundry which recently sold at \$45, Valley furnace, came from an outside point. Malleable iron, which has held nominally at \$50, has dropped to \$46 on a fair siz d sale for early delivery.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being \$1.96 per gross ton:

Basic				 								٠				.\$40.00
Bessemer																
Gray forge			 										0			. 44.00
No. 2 foundry		٠				v	٠			0		b				. 45.00
No. 3 foundry																
Malleable					0			٠				,				. 46.00

Ferroalloys .- The market here is absolutely dead and prices are purely nominal. Makers of ferromanganese do not seem inclined to meet the prices that are being established on resale tonnages of this material and still are quoting \$170, seaboard, for 76 to 80 per cent alloy, as against a price of \$155 to \$160 at which resale tonnages are reported to have been moved. Owing to the lack of any important purchases, the effect of the strike of the British coal miners upon the market is practically nil. Nothing has been done lately on spiegeleisen or in ferrosilicon, and consequently it is impossible to make any change in prices. An advance in 50 per cent is a possibility, due to the fact that several war producers have withdrawn from production and output and demand are likely to be much closer together soon than they have been since the signing of the armistice.

We quote 76 to 80 per cent domestic ferromanganese \$160 to \$175. delivered Pittsburgh, for either prompt or deferred shipment: English, \$165 to \$170, seaboard. We quote average 20 per cent spiegeleisen at \$80, furnace and 50 per cent ferrosilicon at \$75 to \$80, furnace freight allowed. Bessemer ferrosilicon is quoted f.o.b. Jackson County and New Straitsville. Ohio, furnaces as follows: 9 per cent, \$66; 10 per cent, \$69.50; 11 per cent, \$72.80; 12 per cent, \$76.10; \$70 per cent, \$60; 9 per cent, \$62; 10 per cent, \$64.50; 11 per cent, \$67.80; 12 per cent, \$69.80. The present freight rate from Jackson and New Straitsville, Ohio, into the Pittsburgh district is \$4.06 per gross ton.

Structural Material.—The past week has been the quietest of any recently experienced by fabricating industries in this district, and in the lack of new awards some shops soon will be in need of business to keep going. As the winter approaches investors are less inclined to close against their projects and the more general opinion is that not much business will come out during the next few months. Competition for such orders as are up is sharp and prices favor buyers. Plain material is inactive and inclined lower with all independent companies now quoting structural beams at 3.10c., but not adhering firmly to this figure when attractive orders are presented. We note one sale of shapes to a tank building company at 3.10c. Prices are given on page 1161.

Billets and Sheet Bars.—There has been no increase in the demand nor are prices any stronger now than they have been in the past few weeks. Actually, if there is a definite price tendency, it is in the buyers' favor and quotations have only a limited basis in sales. Generally, the independent manufacturers are quoting 4 x 4-in. rerolling billets at \$60, Pittsburgh, but one producer has named a price of \$55, mill, and since the freight into Pittsburgh is small, probably will make that price f.o.b. Pittsburgh against attractive inquiries. There seems to be no justification for a higher price than \$70 on forging billets, as tonnages have been of-

fered at that figure without takers, and it is believed that a recent sale at \$65 could be repeated. Forging companies have suffered very sharp curtailment of business and are not eager buyers of raw material. While a small tonnage of Bessemer sheet bars for immediate delivery recently was made at \$70, Youngstown, this transaction hardly is representative of the market, as practically all independent makers are offering to take business in open-hearth sheet bars at \$65, and some makers, whose rolling capacity is within a rather limited range, are not able to get that price. It is reported that a Chicago district maker has offered to take business at \$60.

We quote 4 x 4-in. soft Bessemer and open-hearth biliets at \$38.50 to \$60; 2 x 2-in. billets, \$42 to \$63.50; Bessemer sheet bars, \$47 to \$65; open-hearth sheet bars, \$47 to \$65, and forging billets, ordinary carbons, \$65 to \$70 base, all f.o.b. Youngstown or Pittsburgh mill.

Wire Rods.—Independent makers still are quoting \$75 for base sizes of ordinary soft rods, but that this price is maintained is due less to the demand than to the fact that some makers are curtailing production. Secondary manufacturers are not in as pressing need of tonnages as they were a while ago, owing to the falling off in demand for finished products. Prices are given on page 1161.

Plates.—The market is distinctly easier and the spread between the minimum independent quotation and that of the Steel Corporation now is a matter of only \$4 per ton, a sale of 3000 tons being noted at 2.85c. At the same time, a Pittsburgh independent recently closed on 1200 tons at 3.25c. Generally the independent companies are quoting 3.25c. as the public price, but the sale at 2.85c. is understood to have brought a quotation of 3c. from a northern Ohio mill. A St. Louis producer recently named a price of 2.65c. Pittsburgh and a Chicago district independent 2.75c., presumably against Western business, which, of course, would give the producers the advantage of the freight from Pittsburgh to their mills.

We quote sheared plates of tank quality, ¼ in. and heavier for early delivery from independent mills at 2.85c. to 3.25c. Pittsburgh. The Carnegie Steel Co. still quotes 2.65c. and is accepting business at that figure, but it not guaranteeing early delivery.

Wire Products.—No change is noted in independent company prices and indications are that present quotations will hold for a while, as the mills are still fairly heavily booked and not inclined to sacrifice profits to secure orders. It is evident, however, that the leading interest is shipping nails more freely as the independent makers are hearing more frequently about \$3.25 nails than they did a short time ago. Buyers still are inclined to fight shy of placing orders at a fixed price for 1921 delivery. The situation in wire hardly is as strong as it was recently although actual evidence of price reductions is lacking.

We quote wire nails at \$3.25 base, as the price of the American Steel & Wire Co., and \$4.25 to \$4.50 by independent mills. We quote bright basic wire at \$3.25, the price of the American Steel & Wire Co. and \$3.75 to \$4, the price range of the independent mills.

Tin Plate.—Business is seasonably quiet and the general attitude of the trade is a waiting one. The American Sheet & Tin Plate Co. will open its books for the first half of 1921 about the middle of next month, and what this company names in the way of prices will have considerable bearing on the future market. Such information as is obtainable points to a maintenance of the present base of \$7 per base box, Pittsburgh, by this company. Can companies served by the independent manufacturers must secure their tin plate as cheaply as those served by the leading interests in order to compete.

We now quote tin plate to domestic consumers at \$7 to \$8.50 base box; stock items, \$8.50 to \$9, and for export \$19 to \$11 per base box, all f.o.b. Pittsburgh.

Steel Rails.—Although Cambria Steel Co. is quoting light rails at 3.75c. for 25 to 45-lb. sections, and claims

to have made sales on that basis, the more general maximum is 3.50c. and sales also are noted at 3c. and 3.25c., the lower figure being that of mills rolling light sections for old standard rails.

The Carnegie Steel Co, is still quoting the March 21, 1919, prices, these being 2.45c, for 25 to 45-lb, sections, 2.49½c, for 16-lb, and 20-lb, sections, 2.54c, for 12-lb, and 14-lb, sections, and 2.58½c, for 8-lb, and 10-lb, sections. This company is also quoting standard sections 50 lb, and heavier at \$15 for Bessemer and \$47 for open hearth stock. The Cambria Steel Co, is quoting 25-lb, to 45-lb, sections at 2.75c, 16-lb, and 20-lb, sections, 3.79½c,, 12-lb, 3.84c,, at mill, for such delivery as it can make. The Jones & Laughlin Steel Co, is quoting light rails at 3.25c, for 25 to 45-lb, sections.

Iron and Steel Pipe.—The general decline in the demand for steel products has not spread to wrought iron or steel pipe, inquiry for which is as heavy and insistent as it has been for some time past. Among recent inquiries placed before makers is one from one of the Standard Oil companies involving about 40,000 tons of line pipe including all sizes from 10 and 12-in. for mains down to 2-in. feed line pipe. Export demand for line pipe also is on a big scale, one inquiry being for 300 to 400 miles of 8 and 10-in. pipe. All makers are heavily committed in both oil country goods and standard pipe, and all of them, especially the leading interest, have been much hampered in deliveries lately by the shortage of open top cars. Prices and discounts are given on page 1161.

Iron and Steel Bars .- For a few days recently, the Pittsburgh Crucible Steel Co. had its books open for business and named a price of 2.35c. base. This, however, was an emergency condition brought about by the fact that this company had a definite producing schedule mapped out in keeping with the blowing in of a new blast furnace and in its attempt to go through with its plans at a time when a good many of its old orders were being revised, suspended or cancelled, it offered to take a limited amount of business at the Steel Corporation price. It filled up promptly at that figure and then restored its former basis of 3c. to 3.25c., and now is quoting that range. Independent makers generally are quoting 3.25c., but with the demand extremely moderate and old orders melting away, this price probably could be shaded by at least \$5 per ton by careful buyers. Almost nothing is going on in reinforcing bars and though held by some as high as 3.50c., are not salable at any premium over the soft steel bar base. Prices of iron bars are unchanged, but have not found much basis in sales recently.

We quote steel bars rolled from billets at 2.35c., this being the price of the Carnegie Steel Co. for very indefinite delivery, likely not before first quarter of next year. Other mills rolling steel bars from billets quote from 3c. to 3.25c, at mill, prices depending entirely on the buyer and the delivery wanted. We quote reinforcing bars, when rolled from billets, at 3.25c, to 3.50c., and from old steel rails at 3c. at mill. We quote common iron bars at 4.75c. and refined iron bars at 5c. to 5.50c. in carloads, f.o.b. mill, Pittsburgh,

Cold Finished Steel Bars.—No improvement is observed in the demand and specifications against old orders are slow. The market still is quotable at from 4c. to 4.25c., base, this range including the price of both the American Steel & Wire Co. and the independent makers.

Spikes.—The Atchison, Topeka & Santa Fe Railroad is in the market for 15,000 kegs of standard spikes. This constitutes the only important inquiry recently noted. Makers are catching up steadily with their old orders, but are not yet badly enough in need of new ones to shade prices given on page 1161.

Nuts, Bolts and Rivets.—The situation is unchanged except that the eagerness of buyers to secure supplies is less marked and the premiums for early deliveries are not as readily obtainable as they were a short time ago. Prices and discounts are given on page 1161.

Hot-Rolled and Cold-Rolled Strips.—Specifications against orders have increased considerably during the

past week or ten days, some companies reporting the gain to be as much as 20 per cent over the previous week's experiences. It is claimed that the bulk of the recent sales of cold-rolled strips has been at 8.50c., base, and in hot-rolled at 5.50c., base, but some makers are accepting business at 8c. and 5c. respectively. The full range of cold-rolled strips is from 6.25c. to 8.50c., to include the quotation of the American Steel & Wire Co.

Sheets.—Prices continue to recede with independent companies and quotations as low as 6.50c. now are fairly common on the base gage of black sheets, of 8c. and even 7.75c. on galvanized and of 4.90c. on blue annealed. The Republic Iron & Steel Co., which has been out of the market for some time on sheets, yesterday announced its willingness to take on tonnages of black sheets for immediate delivery at 6.50c., base. This figure also is being quoted by several other producers, although there have been sales as high as 7.15c. Independent companies are running about 85 per cent capacity, but this average is well above that of the leading interest, which is suffering from a scarcity of steel. Prices are given on page 1161.

Hoops and Bands.—The market still is more favorable to buyers than to sellers, and while the price of one large independent is 5c., base, this figure is being shaded by others by as much as \$10 per ton, and one company which occasionally is a producer recently took some business at around 4c.

Cotton Ties.—The season is practically over as far as rollings are concerned, and few shipments remain to be made. Shipments made in November will carry a price of \$2.075 from the mills of the Carnegie Steel Co. and \$2.525 from independent makers.

Coke.-The slump in spot prices which began to develop a week ago still is unchecked, a further decline of about \$4 per ton being observed in the market for spot furnace fuel, which now is quotable at from \$11.50 to \$12 per net ton, oven. Both producers and brokers are freely offering tonnages at \$12, but are experiencing: only a feeble response from buyers, most of whom are still so well provided that they are not interested in the market at present. Since indications point so strongly to even lower figures, even those who might use a small tonnage are not especially anxious for it. The usual crop of threats of the putting out of ovens which usually attend a sharp reaction in prices is in circulation, but the opinion is expressed that even curtailment of production will not have much effect upon prices for the present in view of the fact that a declining market in pig iron has caused a reduction in the blast and a number of furnaces in the Pittsburgh district have been banked or blown out. The Brier Hill Steel Co., Youngstown, has blown out one furnace and probably will withdraw the blast from another. The furnace of the Perry Iron Co., Erie, Pa., is down and No. 4 furnace of the Shenango Furnace Co., Sharpsville, Pa., went out of blast late last week. There has been considerable curtailment of blast furnace activities in the Buffalo district, and the releasing of substantial tonnages of contract fuel at a time when demand was extremely limited has very much unsettled the market. At the present time the coke market is much out of line with the coal market, but with the latter slipping it is doubtful whether coke oven operators will long be able to cut coke production and ship their coal to advantage. Operators have endeavored to line up some first half contracts on the basis of \$12, but without success. The decline in the price of foundry coke has not been so rapid as that in the furnace grade. Sales have taken place within the past week at as high as \$17 per net ton, oven, for selected 72-hr. fuel, but this coke is guaranteed to be less than 1 per cent in sulphur. It is doubtful whether more than the usual premium of \$1 per ton over the furnace grades could be obtained to-day, as the foundries are not particularly heavy buyers and it is noted that among some of the recent offerings of furnace coke was some which previously had been moving against foundry contracts. One large interest reports having taken considerable first half business on a basis

of \$15 per net ton, oven. It is doubtful whether that price could be obtained on any such business to-day.

Old Material.—The market on steel works grade of scrap iron and steel is at least \$1 per ton off from last week's prices, and in the foundry grades and those going to special users an even greater decline is noted. Consumers generally have withdrawn from the market and have so much material on hand that the only possible way to interest them is by naming prices so attractive that the chance of loss is slight. Sales of heavy melting steel are noted to a Pittsburgh district steel company at \$27, and in the maintenance of the usual differentials, other open-hearth grades are correspondingly lower. Offerings of bundled sheet sides and ends are extremely moderate because many of the producers now have compressing machines and are no longer bundling their material. Sales of iron car axles are noted at \$52, delivered Pittsburgh, a decline of about \$3 from former quotations, and the market is off at least \$2 per ton on steel axles and cast iron car wheels, and from \$1.50 to \$2 per ton on cast scrap for foundry and steel works use. It is reported that as much as \$27.50 was paid for heavy melting steel recently offered by the Pennsylvania Railroad, Eastern Division. The Baltimore & Ohio Railroad has asked for

bids on 7590 gross tons, or 25 carloads of scrap, which must be in by noon, Oct. 29.

We quote for delivery to consumers' mills in the Pittsburgh and other districts that take Pittsburgh freight lates as follows:

Heavy melting steel, Steubenville,		
Follansbee, Brackenridge, Mones-		
sen, Midland and Pittsburgh, deliv.		
No. 1 cast (for cupola)	38.00 to	39.00
Rerolling rails, Newark and Cam-		
bridge, Ohio; Cumberland, Md.;		
Franklin, Pa., and Pittsburgh	38.00 to	39.00
Compressed sheet steel	22,00 to	22.50
Bundled sheet sides and ends, f.o.b.		M M. 11
consumers' mills, Pittsburgh, dist.	17.00 to	17.50
Railroad knuckles and couplers	28.00 to	28.50
Railroad coil and leaf springs	28.00 to	28.50
Railroad grate bars	27.50 to	28.00
Low phosphorus melting stock	21.00 10	20.00
(bloom and billet ends, heavy		
plates, ¼ in, and heavier)	33.00 to	34.00
Railroad malleable	32.00 to	33.00
Iron car axles	52.00 to	53.00
Locomotive axles, steel	44.00 to	45.00
Cast iron wheels	40.00 to	41.00
Steel car axles	40,00 to	41.00
Rolled steel wheels	28.00 to	28.50
Machine shop turnings	15.50 to	16.00
Sheet bar crop ends (at origin)	30.00 to	31.00
Heavy steel axle turnings	22.00 to	23.00
Short shoveling turnings	18.00 to	19.00
Heavy breakable cast	32.50 to	33.00
Stove plate	29.00 to	30.00
Cast iron borings	19.00 to	19,50
No. 1 railroad wrought	30,00 to	31.00

NEW BRICK CARD

Extras for Sizes and Shapes by Most Producers of Refractories

PITTSBURGH, Oct. 25 .- While the general report from practically all makers of blast furnace and steel plant brick is favorable with regard to shipment, consumers evidently are not as well supplied as they would like to be and continue to make active demands. As far as operating conditions are concerned, however, manufacturers report there has been no betterment in the situation. Although coal has come down somewhat in price in the past two weeks, it still is relatively high and this has an important bearing on the price of silica brick, while fire-clay brick prices are affected by the fact that the coal mines still are providing more remunerative employment than the clay mines. It is doubtful whether fire-clay brick plants in the recent past have averaged over 50 per cent operations. While the market at the moment is extremely firm, there are no indications of further advances and in the event that the conditions underlying prices—the scarcity of labor and the high cost of fuel-are modified, it is barely possible that some recessions may occur in keeping with the general trend of commodity values.

The new card of price extras for sizes and shapes, for special sizes and shapes of fire-clay brick and silica brick, which has been under consideration by the industry for some little time, has been adopted by a large percentage of the producers of these kinds of refractories. As was intimated in The Iron Age of Sept. 16 last, the plan used follows very closely the percentage method used by the manufacturers of steel plates.

Shapes are classified according to cost of manufacture and each class takes a percentage extra over the base price. Thus the extra or up charge on any class of shapes automatically changes with any change in the base price.

A large number of the shapes in common use have been classified according to the costs of production and it is expected that as further cost figures are obtained a complete list of all shapes in general use can be prepared. This is the first general change in fire brick extras since brick were selling for \$18 to \$20 per 1000 in 1912 and 1913.

As labor costs represent the larger part of extra costs on special shapes, the increases in wages during the past few years made a change in extras necessary. The classification, while based on recent cost figures, follows closely the same percentage of the 9 in. base price as embodied in the old list of extras.

The classes and percentage extras for each are shown below:

Date Har			Extras	to Be	Added			
When 9- Base Is	-in.	8 %	B 15%	C 30%	D 45%	E 60%	F 75%	G 100%
25.00 30.00 35.00 40.00 45.00 50.00 55.00		.\$3.00 .3.00 .3.00 .3.20 .3.60 .4.00 .4.80	\$3.00 3.75 4.50 5.25 6.00 6.75 7.50 8.25 9.00 9.75	\$6.00 7.50 9.00 10.50 12.00 13.50 15.00 16.50 18.00 19.50	\$9.00 11.25 13.50 15.75 18.00 20.25 22.50 24.75 27.00 29.25	\$12.00 15.00 18.00 21.00 24.00 27.00 30.00 36.00 39.00	33.75 37.50 41.25 45.00	25.00 30.00 35.00 40.00 45.00 50.00 55.00 60.00
When 9- Base Is		H 135%	J	1	<	L 00%	M 400%	N 500%
\$20.00 25.00 30.00 35.00 40.00 45.00 50.00 60.00		33.78 40.50 47.25 54.00 60.75 67.50 74.28	43.7 52.5 61.2 70.0 78.7 87.5 96.2 105.0	5 56 0 67 5 78 0 90 5 101 60 112 5 123 0 135	.25	75.00 00.00 05.00 20.00 85.00 60.00 85.00	\$80.00 100.00 120.00 140.00 160.00 180.00 200.00 220.00 240.00 260.00	\$100,00 125,00 150,00 175,00 200,00 225,00 250,00 275,00 300,00 325,00

Minimum, \$3.00 up.
In connection with this plan, the following rules on quantity differentials have been established.

Rule 1. All specifications for one specific shape amounting to 2500 9-in. equivalent and over apply classification.

Rule 2. All specifications for one specific shape amounting to 2499 to 500 9-in. equivalent apply next higher class.

Rule 3. All specifications for one specific shape amounting to less than 500 9-in. equivalent apply second higher class.

For the convenience of customers, shapes will continue to be sold at piece prices. Should this plan be generally adopted by the refractory industry, it is believed it will be very favorably received by the users of brick, as it does away with the almost endless confusion and irregularity that formerly resulted from the use of various plans of figuring piece extras.

We quote per 1000 f.o.b. works: Fire Clay: High Duty	Moderate Duty
Pennsylvania .\$50.00 to \$60.00 Ohio . 47.00 to 55.00 Illinois .50.00 to 60.00 Kentucky .50.00 to 55.00 Missouri .60.00 to 65.00 Silica Brick:	\$45.00 to \$50.00 40.00 to 45.00 40.00 to 50.00 45.00 to 50.00 45.00 to 55.00
Pennsylvania Chicago Birmingham Magnesite Brick:	55.00 to 60.00
Standard size, per net ton	
Standard size, per net ton	50.00

Delivery of the 500 steel freight cars ordered by the Youngstown Sheet & Tube Co., Youngstown, Ohio, is expected to start this week at the rate of 24 cars daily and will be completed before end of the year.

New York

NEW YORK, Oct. 26.

Pig Iron.-"An orgy of reselling" is the way one dealer describes the present condition of the market, which is almost destitute of transactions so far as furnaces are concerned. Furnace representatives point out that foundries which are usually buyers are not proving very successful in maintaining prices, while acting as sellers. These resellers are competing with each other and all kinds of prices are being made. Buffalo iron, particularly, is weak, and sales of No. 2 plain are made at \$40 to \$42, Buffalo furnace. Eastern Pennsylvania and Virginia irons are not so prominent in the reselling, but it is not difficult to buy from \$3 to \$4 below the furnace quotations. Foundries report that their melt is keeping up and the present activity in reselling is attributed largely to overbuying for speculative purposes or because it was feared that deliveries could not be obtained.

Ferroalloys .- The ferromanganese market is unchanged, with the quotation for both domestic and foreign alloy nominal, based on \$170, seaboard, for delivery through June, 1921. Some resale alloy is still available at \$155 to \$160. The spiegeleisen market is evidently lower. The high grade alloy is offered at concessions from the hitherto prevailing price of \$82.50, furnace, and some sales have been made at lower levels. The manganese ore market is also weaker, there having been sales of fair sized lots of foreign ore, already shipped to this country, at concessions from the price paid hitherto. The 50 per cent ferrosilicon market is inactive and unchanged at \$75 to \$80 per ton, delivered.

Cast Iron Pipe.—Numerous small orders for pipe are keeping mills well filled for this year. Labor is still to obtain. Prices remain unchanged. difficult quote f.o.b. New York, 6 in. and larger, \$77.22; 4 in. \$87.22; 3 in., \$97.22, with \$2 additional for Class A and

High Speed Steel .- Domestic producers are maintaining their quotations of \$1.25 per lb., New for 18 per cent tungsten high speed steel. Sales of imported steel are reported at \$1 per lb. and less. recent sale by an American company to the Navy Department of the Government is noted at \$1.25 per lb., amounting to about \$54,000.

Finished Iron and Steel .- The outstanding transaction of the week was the purchase by the Standard Oil Co. of New Jersey of 6000 tons of tank plates, 3/16 in, and heavier for prompt delivery, at a price reported to be 2.95c., Pittsburgh. The business was divided among several mills, all of which had quoted 3c., Pittsburgh, but were persuaded to shade their price another \$1 per ton. A locomotive company, which is in the market for 1300 tons of boiler and tank steel for prompt delivery, will probably place orders this week. Some mills are reported to have quoted comparatively low prices on this business. What is taken as indication that some railroads expect lower prices is the withdrawal of car inquiries which have been in the market Car builders assert that their estifor some weeks. mates are based on Steel Corporation prices, and not on the prices which are quoted by independent mills. The Seaboard Air Line, which was in the market for 2000 cars, will wait until the first of the year or later buy and a similar decision has been reached by the Illinois Central, which had inquired for 800 cars for its subsidiary line, Central Railroad of Georgia. The Nor-folk & Western Railroad is in the market for 1000 120ton hopper cars. Steel bars are purchasable at 3c., Pittsburgh, but little is doing. Further reports have been received of shortening time and shutdowns of industrial plants. The structural steel market continues

extremely quiet. A few jobs have been placed as follows: 400 tons for a bridge for the Central Railroad of New Jersey to the Phoenix Bridge Co.; 250 tons for the Cheswick Power Co.'s plant, near Pittsburgh, to the Riter-Conley Co.; 250 tons for a building for the Barber Asphalt Co., Maurer, N. J., to the Levering & Garrigues Co. The Standard Oil Co. of New Jersey is in the market for 600 tons of fabricated work for a pier at Bayonne, N. J.

We quote for mill shipments, New York, as follows: Soft steel bars, 2.73c. to 3.38c., with 3.63c. still asked; plates, 3.03c. to 3.38c., with 3.63c. still asked; shapes, 2.83c. when purchased from the United States Steel Corporation and 3.48c. when purchased from other producers; bar iron, flats, wider than 6 in., 5.38c., with half extras; light rounds, squares and flats, 5.88c., with full extras, and other sizes, 4.88c., with half extras.

Old Material.—Transactions are so few that it is difficult to ascertain prices. Most dealers are inclined to hold on at present prices, as buyers evidently cannot be interested by lower quotations. A few sales are reported at low figures by dealers who are overstocked and are forced to sell. Exports of old material to England have practically ceased since the coal strike and much of the tonnage previously ordered is being delayed or has been cancelled. Heavy melting steel is off 50c., although few sales are reported at the lower-price of \$18 to \$18.50 per ton. Rerolling rails have been dropped in most cases about \$1.50 per ton, \$29.50 to \$30 per ton now being quoted. One New York broker has reduced his quotations from 50c. to \$2 on most items in his list. No. 1 machinery cast is quoted to local foundries at \$37.50 to \$38 with few sales reported. One dealer reports a recent small order at the latter figure, although the general tendency is to shade these prices as much as possible.

Buying prices per gross ton, New York	. follow:
Heavy melting steel	18.00 to \$18.50 29.50 to 30.00
Steel car axles	55.00 to 56.00 28.00 to 29.00 43.00 to 44.00
Wrought iron track	22.50 to 23.00 18.50 to 19.00 11.00 to 11.50
No. 1 yard wrought long	19.00 to 20.00 9.00 to 10.00 16.50 to 17.00
Machine-shop turnings Mixed borings and turnings	13.00 to 13.50 13.00 to 13.50
Stove plate	16,00 to 17,00 23.00 to 24.00 23.00 to 24.00 22.00 to 23.00 35.00 to 36.00

Prices which dealers in New York and Brooklyn are quot-to local foundries, per gross ton:

No. 1 machinery cast........\$37.50 to \$38.50
No. 1 heavy cast (columns, building materials, etc.), cupola size..... 37.50 to 38.50
No. 1 heavy cast, not cupola size.... 27.00 to 28.00
No. 2 cast (radiators, cast boilers, etc.) 27.00 to 28.00

Warehouse Business .- But little change from last week is noted in prices. Business continues light. Considerable comment has been occasioned by the report that the Pittsburgh Crucible Steel Co. is accepting orders for soft steel bars at 2.35c. per lb. and there is a feeling that other mills may follow this example and draw still closer to the Steel Corporation prices. Although warehouses continue to purchase from the mills. few are making any great attempt to stock up, believing that still lower quotations are coming shortly. Brass and copper sheets, wire and brass rods have sustained another reduction of about 1c. per lb. by most warehouses. A slight reduction in prices of blue annealed, black and galvanized sheets is contemplated by some warehouses and slightly lower quotations on tin plates. We quote prices on page 1176.

Clash on Intra-State Freight Rates

For a second time the State Public Utilities Commission of Illinois has denied the application of the railroads for a 40 per cent increase in intra-state freight rates to meet the interstate advances authorized in August. The State commission has affirmed its exclusive authority to regulate rates within the State and gives notice that its contention will be carried to the United States Supreme Court, if necessary.

Boston

BOSTON, Oct. 26.

Pig Iron.-New business remains practically negligible. One seller, accustomed to doing much business in normal times, has sold but 50 tons of iron in a week, this being charcoal iron. Furnaces will not cancel old orders except in rare instances, but sellers will assist in reselling. However, there is not much demand for resale iron and much iron goes begging at low prices. One buyer offers to resell Buffalo iron, silicon 2.75 to 3.25, at \$46, furnace, there being a \$5.46 freight rate here; if this price is not acceptable, he invites an offer. Some iron in New England is offered on cars at \$46.25, for silicon 2.25 to 2.75, the freight being less than \$2.50. Buffalo iron, 2.25 to 2.75 silicon resale, has been disposed of at as low at \$43.50, furnace. It is even reported that \$1 lower than this has been the price of transaction for Buffalo iron of this silicon content. It has been variously estimated that buying for 1921 will set in on a large scale after election until April. A seller of Southern iron has 4000 tons of foundry iron piled in Providence and expects to have 9000 tons before this week is over, thereby contributing to the New England supply when snowbound traffic prevents deliveries from furnaces. Foundries have had many cancellations; others have present business, but no future prospects but in some districts foundries are well supplied with work. Delivered pig iron prices follow:

Eastern Pa., sil. 2.25 to	2.75\$50.31 to \$55.31
Eastern Pa., sil. 1.75 to	2.25 49.06 to 54.06
Buffalo, sil. 2.25 to 2.75.	50.71 to 55.71
Buffalo, sil. 1.75 to 2.25.	49.46 to 54.46
Virginia, sil. 2.75 to 3.25	54.58 to 59.58
Virginia, sil. 2.25 to 2.75	52.83 to 57.83
Virginia, sil. 1.75 to 2.25	51.58 to 56.58
Alabama, sil. 2.75 to 3.2	5 52,66 to 55.66
Alabama, sil. 2.25 to 2.	75 50.91 to 53.91
Alabama, sil. 1.75 to 2.	25 49.66 to 52.66

Warehouse Business.—There was a reduction, effective Oct. 16, on both galvanized sheets and black sheets. No. 28 gage galvanized now sell for \$10.50, base, and No. 28 black sheets for \$9.15 base, or a reduction on 100 lb. of \$1 in the case of galvanized and 75c. in the case of black sheets. Jobbers are considering further reductions in other materials and a meeting early this week of jobbing interests may decide the matter. One or two warehouses have already reduced items other than mentioned above. Small flats and rounds and cold-rolled steel have good demand. There is also active asking for sheets, but a small supply. Deliveries are better than for some time. The situation in general is improved compared with a fortnight ago.

In general is improved compared with a forting ago. Jobbers quote: Soft steel bars, \$5.50 to \$6 per 100 lb. base; flats, \$6.50 to \$6.85c.; concrete bars, \$5.50; tire steel, \$6.50 to \$7; spring steel, open hearth, \$11; crucible, \$16; steel bands, \$8 to \$8.25; steel hoops, \$9: toe calk steel, \$7.60; cold-rolled steel, \$7.80; vold-rolled steel, \$8.00; structural, \$5 to \$6; plates, \$5.50 to \$6.55; No. 10 blue annealed sheets, \$7.80; No. 28 black sheets, \$9.15; No. 28 galvanized sheets, \$10.50; refined iron, \$5.50 to \$8; best refined, \$7.50; Wayne, \$9.50; band iron, \$8; hoop iron, \$9; Norway iron, \$20.

Finished Material.—Bids were opened last week for the steel for the battleship Massachusetts, to be built at the Fore River plant, Bethlehem Shipbuilding Corporation, Quincy, Mass. However, there was a scarcity of bidders, sales representatives claiming that Navy specifications are so strict in peace time that business is not thoroughly satisfactory. Structural steel awards The American Bridge Co., Boston office, \$750,000 plant addition of the American Brass Co., Ansonia, Conn.; the Berlin Construction Co., Berlin, Conn., a bridge in Hartford County, Conn., costing \$500,000; the H. Tower Iron Works, Providence, R. I., mill addition of the American Printing Co., Fall River, Mass., costing \$250,000; the George F. Watts Corporation, New York, \$3,000,000 power plant at Bridgeport, Conn., of the United Illuminating Co. Though the car situation is better, there is still a scarcity of gondola cars and box cars are being used for structural steel. There are some requests for cancellations of shapes but no mills will honor them. The most firmly fixed independent mill price is that on shapes at 3.10c., burgh. Plates are reported sold recently by independents at 3.15c., though 3.25c. is more prevalent and 3.50c. is often asked. Independent prices on bars range from 3.25 to 4c. There is a scarcity of wire products, and steel pipe.

Old Material.—The market is practically void of activity and what tests of the market are made show a downward tendency. Dealers were paying \$26 delivered to Monessen for heavy melting steel until the ast of last week, when this price dropped 50c. Similarly, steel for Munhall, which was bought on the basis of \$26.50, delivered, has now dropped about \$1. Buying prices for machinery cast range from \$35 to \$42 and some dealers will not buy it at any price. Notwithstanding conditions, dealers are generally optimistic, believing mills have but small stocks of scrap. Local yard prices on old material follow:

No. 1 heavy melting steel \$16.50 to	17.50
No. 1 railroad wrought 22.00 to	23.00
No. 1 yard wrought 19.00 to	20.00
Wrought pipe (1 in. in dia., over 2 ft.) 14.00 to	15.00
Machine shop turnings 12.00 to	13.00
Cast iron borings 16.00 to	17.00
Heavy axle turnings 13.00 to	14.50
Blast furnace borings and turnings 11.50 to	12.50
Forged scrap 11.00 to	12.00
Bundled skeleton 11.00 to	12.00
Street car axles 28.00 to	30.00
Car wheels 34.00 to	35.00
Machinery cast 37.00 to	38.00
No. 2 cast	36.00
Stove plate 25.00 to	26.00
Railroad malleable	26.00
Rerolling rails 30.00 to	31.00
	0. 5

Buffalo

BUFFALO, Oct. 26.

Pig Iron.—More business was done during the past week than during the previous week. Though many believe furnace prices will eventually soften there is no record of below-quotation selling except for resale lots, of which there is considerable tonnage. Foundry figured largest in the week's selling and although there were few big tonnages sold, the aggregate brings the week's bookings higher than for some months past. One producer sold 5000 tons of foundry for the first quarter and first half. Another producer sold 2000 tons for this year's delivery. Additional inquiry of from 1500 to 2000 tons of foundry is reported. One malleable maker reports the sale of two lots of this iron, totaling 1000 tons. Furnaces report easement in coke and all units are in full production.

We quote f.o.b. Buffalo, the lower prices of foundry grades being resale:

No. 1	foundry,	2.75 to	3.25 sil	\$	45.25 to	\$50.25
No. 2	X found	ry. 2.25	to 2.75	sil	43.50 to	48.50
No. 2	plain, 1.	75 to 2	.25 sil		42.25 to	47.25
Basic						48.00
Malle	able				47.00 to	
Lake	Superior	charcoa	1		58.00 to	60.00

Finished Iron and Steel.—There is little trading as compared with some weeks earlier in the year, but mills are booking a certain amount of tonnage-not as much as they would like, but sufficient to prevent the trade from growing pessimistic over the situation. The buying public is holding off to some extent and the business being done is of a hand-to-mouth nature, Prices are no weaker than last week. The bar inquiry has fallen off considerably, so that it is no longer possible to say that the demand for this line is slightly ahead of other semi-finished material. The bar price is at present pretty generally 3.25c., though some have been booked during the past week at 3.50c. The plate price of 3.25c. seems to be very firm. Shapes are quoted at 3.10c. One mill here is booking about 2000 tons of all lines a day, another probably 1000 tons. Wire mills are operating at capacity and cannot catch up to bookings. Some mills are making fairly prompt shipments, but most of them are out of the market on product for delivery the balance of this year.

Warehouse prices f.o.b. Buffalo are: Steel bars, 4.65c.; shapes, 4.15c.; plates, 4.30c.; No. 10 blue annealed sheets, 7.15c.; No. 28 black sheets, 9.10c.; No. 28 galvanized sheets, 10.60c.; hoops, 6.60c.

Coke.—Sales agencies here report a pronounced easement. Foundries and furnaces appear to be filled up. Prompt Connellsville coke can be bought for \$16-\$17. Foundry can be had for \$18 and possibly less.

Old Material.—The demand for material is now mostly from dealers. They are engaged in shipping on old orders, and in view of the fact that all lines are now lower than the prices at which dealers could buy when the orders were closed, their profits are greater. An unusual effort is being put forth by dealers this week to fill old orders and clean their slates. Mills are increasingly particular about accepting shipments which must be strictly according to specification or stand the risk of being rejected. The price on several commodities has weakened since last week, notably heavy melting steel, which is now quoted at \$24 to \$25.

We quote dealers' asking prices per gross ton, f.o.b. Buffalo as follows:

as lonows.		
Heavy melting steel, regular grades. \$24.00 to \$25.0	0	
	0	
	0	
No. 1 machinery cast 40.00 to 41.0	0	
	0	
	0	
Railroad malleable 30.00 to 31.0	0	
Machine-shop turnings 14.00 to 15.0	0	
Heavy axle turnings 19.00 to 20.0	0	
	0	
Iron rails 31.00 to 32.0	0	
Locomotive grate bars 24.00 to 25.0	0	
Stove plate 30.00 to 31.0	0	
Wrought pipe 19.00 to 20.0	0	
No. 1 busheling	0	
Bundled sheet stampings 15.50 to 16.0	0	
	Hydraulic compressed 21.50 to 22.5 Low phos., 0.04 and under 32.90 to 32.5 No. 1 railroad wrought 31.50 to 32.5 No. 1 machinery cast 40.00 to 41.0 Iron and steel axles 41.00 to 42.0 Car wheels 38.00 to 39.0 Railroad malleable 30.00 to 31.0 Machine-shop turnings 14.00 to 15.0 Heavy axle turnings 19.00 to 20.0 Clean cast borings 18.00 to 19.0 Iron rails 31.00 to 32.0 Locomotive grate bars 24.00 to 25.0 Stove plate 30.00 to 31.0 Wrought pipe 19.00 to 20.0 No. 1 busheling 19.00 to 20.0	Heavy melting steel, regular grades. \$24.00 to \$25.00 Hydraulic compressed 21.50 to 22.50 No. 1 machinery cast. 40.00 to 32.50 No. 1 machinery cast. 40.00 to 41.00 Car wheels 38.00 to 39.00 Railroad malleable 30.00 to 39.00 Machine-shop turnings 14.00 to 15.00 Heavy axle turnings 18.00 to 19.00 Clean cast borings 18.00 to 19.00 Iron rails 24.00 to 25.00 Stove plate 30.00 to 31.00 to 31.00 to 30.00 to 31.00 to 30.00 to 30.0

Birmingham

BIRMINGHAM, Ala., Oct. 26.

Pig Iron.-While Birmingham iron operators appear more disposed to look for some recession in prices for 1921 business when a new purchasing movement comes, they are not apparently inclined to yield anything for the spot business that is offered. Some surprise was created when it became known that one of the largest operators had sold half of its make up to Oct. 20. Practically all of this was spot or near-spot business. One lot of 1000 tons and one of 500 tons for Middle Western delivery are reported to have been sold at the \$42 base. Sales of special analysis iron known as the Clifton brand have been made on the basis of \$45, and some of it brought as high as \$48. About 1200 tons was so disposed of. This iron is low in phosphorus and high in manganese. Consumers, who had said they could get spot iron \$3 under the market, have closed at market base. Production has been further decreased by the blowing out of the Holt stack of the Central Iron & Coal Co. and a stack of the Alabama Co. at Gadsden. There are four fewer stacks going than at this time a month ago. The hold-up orders do not amount to very much, while, on the other hand, many consumers have insisted on prompt shipment. With stocks as low as they are and the furnaces sold up for six months, the makers feel that they have certainly until after the election to consider changes. Deliveries are easy and the iron is going ahead well. The pipe melt will be cut down considerably from now until the close of the year at least. This will have its effect on the general bearing of the market. No one seems able to locate the reported offering of iron at \$38 and under and none acknowledges such a base except the leading interest, and there is no change there, the \$38 base having been maintained by it for almost a year. Smaller furnace interests report no sales at all.

We quote per gross ton f.o.b. Birmingham district furnaces, the Tennessee company excepted, as follows:

Foundry,	sil.	1.75	to	2.25.	 	.\$42.00
Basic					 ********	. 41.00
Charcoal						60 00

Cast Iron Pipe.—All pipe is finally acknowledged to be going slow. The sanitary shops at Talladega and Holt are down and others are reducing production. Some shading of prices has been made by some of the new plants, which cut to \$87.50. No new business of consequence has developed in any quarter and none is expected until toward the beginning of the year. The United States Cast Iron Pipe & Foundry Co. is shipping 1500 tons of water and gas pipe to Cuba, 2000 tons of water and gas pipe to Pacific coast via Mobile, and 500 tons additional water pipe to Santos, Brazil.

Coal and Coke.—Blue Book contracts—contracts made by operators with men at each mine—have been practically repudiated by the United Mine Workers and a new contract with full recognition demanded. Strikes have occurred at all mines of the Alabama Co., Searles, Brookwood and Lewisburg. Production remains about the same as the past several weeks. Coke is easier and lower following the blowing out of several furnaces and larger supply. New base for 1921 on standard foundry is \$12.50 to \$13.50 for 6-months contracts. Spot coke now ranges from \$14 to \$16 with plenty offering.

Old Material.—Beyond delivery on old contracts there is nothing doing in the scrap market. Consumers are not at all interested in any class of offerings. Prices remain nominally at the recent reductions.

We quote per gross ton f.o.b. Birmingham district yards, prices to consumers, as follows:

the second contract of			-	•						
Old steel rails								\$19.00	to	\$20.00
Heavy melting stee	1.							18.00	to	19.00
No. 1 cast								30.00	to	24.00
Car wheels								29.00	to	31.00
Tram car wheels .										
No. 1 wrought								19.00	to	20.00
Stove plate							 	20.00	to	21.00
Cast iron borings.								9.00	to	10.00
Machine shop turn										

Cincinnati

CINCINNATI, Oct. 26.

Pig Iron.—The market is still very dull, prices on Northern iron ore quotably lower. Where two weeks ago furnaces in southern Ohio were holding their output at \$46 to \$47 for the base grade, they are now willing to accept \$45, and this price was made on a small lot sold during the week. In this iron the manganese ran over one per cent, but the differential was waived. While \$45 is the market based on sales made, it is freely admitted that on a desirable tonnage lower prices could be secured. While no sales of basic are reported in this district, it is said that furnaces, in view of the sales made at \$40 in the Pittsburgh district, would accept orders at \$43, but that high production costs would prevent them taking on business at a lower figure. Silveries continue dull and unchanged, but malleable iron is available at 50c. under last week's quotations. The Southern market remains at \$42, with sales confined almost exclusively to carload lots. It is reported that a Southern interest, usually not a seller of pig iron, has sold a considerable tonnage of foundry iron for prompt shipment to pipe makers on a \$38 base. Resale offerings continue to come out, a round tonnage of Northern iron being offered at \$40, and a small lot of basic at \$39. The dullness in the market has resulted in three furnaces in southern Ohio being banked during the week, and an equal number in the South. Four more furnaces in southern Ohio will be out before the end of the month. Further requests for cancellations are being received, but are meeting with no encouragement from furnace interests where shipments are being made on specified delivery dates.

Based on freight rates of \$4.50 from Birmingham and \$2.52 from Ironton, we quote f.o.b. Cincinnati:

00	ALOIN ALC	meon,	14.0	quo	re i	1.0.0.	Cincin	HOLET .	
	Southern								
	Southern								
	Ohio silve								
	Southern								
	Basic Nor								
	Malleable								 48.02

Coke.—The coke market is decidedly weaker. This is true particularly of Wise County furnace coke, which is freely offered at \$12 for prompt shipment. The weakness is due to the number of furnaces being banked which secure their fuel from this field. It is said that some operators would be willing to accept \$10 for first quarter contracts. Offerings of Connellsville furnace coke are now being made at \$14, representing a decline of \$3 a ton in this market since last week. Foundry coke from both districts remains unchanged, however, the current quotations being \$17.50.

Finished Material.—Wire products and pipe continue in good demand, but other finished products are slow.

Occasional inquiries for steel bars are being received by local representatives of steel mills, but these are mostly for small tonnages. The demand for sheets is slow, particularly from the Southern districts. Mills operating in this territory are well supplied with orders for the remainder of the year, the only tonnages now being sold consisting of lots which have been canceled. These, however, amount to a very small percentage of the output. Black sheets are now quoted at from 7c. to 7.50c. for 28 gage, and galvanized from 8c. to 8.50c. No. 14 and 16 blue annealed sheets, which have been scarce in this market, are softer, the old price of 6.40c. having given way to a 5.10c. to 5.20c. figure at the mills. No. 10 blue annealed is now quoted at 5c., mill, compared with 5.25c. three weeks ago. Warehouses report business as fairly good. Many more orders are being received, but for smaller tonnages than formerly, indicating that consumers are buying only on a hand-tomouth basis. Some warehouses are getting good shipment from mills and their stocks are in good shape to meet the present demand. There is at present a scarcity of concrete reinforcing bars, for which the demand is fairly good. Shipments on the way, however, are expected to relieve the situation. Warehouses expect that business will continue fair for some time, as consumers are expected to call on them for practically all their wants until the present situation has cleared, and they are able to more positively gage the course of the markets before placing their orders for steel sup-Warehouse prices remain unplies with the mills. changed.

Steel bars, 4c. base; shapes, ¼-in, and heavier, 4.10c.; plates, 4.50c.; cold rolled rounds, 1½-in, and over, 6.25c.; cold rolled rounds, under 1½-in, and flats, squares and hexagons, 7c. base; steel bands, 6c. base; No. 10 blue annealed sheets, 7c. base; Nos. 14 and 16 blue annealed sheets, 7½c. base; black sheets, 28-gage, 9 to 10c.; galvanized sheets, 28-gage, 10c. to 11c.; wire nails, \$4.50 per keg base.

Old Material.—The scrap market is dull and weak. Dealers report that prices quoted to-day really mean nothing, as no interest is being shown by consumers, and offerings at materially lower prices would not bring them into the market. A local dealer purchased a small tonnage of heavy melting steel for \$19.50, f.o.b. Cincinnati, for shipment on a contract to a steel maker outside this territory. Several railroad lists came out during the week, but buying by dealers is being done only to complete present contracts.

We quote dealers' buying prices;	
Per Gross Ton	
Bundled sheets\$12.	
Old iron rails 25.	50 to 26.50
	50 to 50.50
	50 to 31.50
Heavy melting steel	50 to 20,50
Steel rails for melting 21.	50 to 22.50
Car wheels 35.	50 to 36.50
Per Net Ton	
	50 to 23.50
	50 to 10.00
Steel turnings 8.	00 to 8.50
	50 to 32.50
	50 to 35.50
	50 to 22.50
	00 to 34.50
	00 to 23.00
	50 to 14.00
	50 to 24.00
	50 to 14.00
Access to the second se	

St. Louis

St. Louis, Oct. 25.

Pig Iron.-The pig iron market at this point seems to be absolutely dead, so far as any real transactions go. There are no reports of sales other than a carload lot here and there, although there are renewed reports of resale iron on the market by the regular furnace representatives in trying to help out customers whose contracts are proving larger than their needs.

Finished Iron and Steel.-Deliveries of finished products have assumed a much more satisfactory state, with the result that there is less of complaint from the consumers who are now getting about what they want, both in the character of the material wanted and the quantities. Although there has naturally been some expectation of lower prices, and especially since the recent speech of Judge E. H. Gary, none has materialized in the St. Louis area, although the independent mills are understood to be more nearly in line with the

Steel Corporation figures and to have lost their desire for premiums for immediate delivery. Movement out of warehouse is good and the incoming volume from the mills is satisfactory.

We quote for stock out of warehouse as follows: Steel bars, 4.07½c.; iron bars, 4.50c.; structural material 4.17½c.; tank plates, 4.37½c.; No. 10 blue annealed sheet 7.27½c.; No. 28 black sheets, cold rolled, one pass, 8.30 No. 28 galvanized, black sheet gage, 9.70c. structural material,

Old Material.—The scrap market is still featureless as both buyers and sellers are disinclined to enter into transactions that commit them far into the future. The trading that is being done by dealers is desultory and only for the purpose of taking care of immediate or special needs of customers. The railroad offerings of the earlier part of the month had a very depressing effect and other conditions have not improved, with the result that quotations are still showing a dropping tendency.

We quote dealers' prices, f.o.b. consumers' works, St. Louis industrial district, as follows:

Per Gross Ton

Old iron railsOld steel rails, rerolling	32.00 to	30.50 32.50
Old steel rails, less than 3 feet Relaying rails, standard section, sub-	21.00 to	21.50
Old car wheels	40.00 to 33.00 to	45.00 34.00
No. 1 railroad heavy melting steel scrap	18.50 to	19.00
Ordinary shoveling steel	19.00 to	19.00 19.50
Frogs, switches and guards cut apart Ordinary bundled sheet	19.00 to 10.50 to	19.50 11.00

Per Net Ton		
Heavy axle and tire turnings Iron angle bars	27.00 to	12,50 27,50
Steel angle bars	19.00 to	19.50
Iron car axles	35.00 to	35.50
Steel car axles	29.00 to	29.50
Wrought arch bars and transoms	30.00 to	30.50
No. 1 railroad wrought	19.50 to	20.00
No. 2 railroad wrought	18.50 to	19.00
Railroad springs	19.00 to	19.50
Steel couplers and knuckles	19.00 to	19.50
Locomotive tires, 42 inches and over,		
smooth inside	17.00 to	17.50
No. 1 dealers' forge	16.00 to	16.50
Cast iron borings	9.50 to	10.00
No. 1 busheling	17.50 to	18.00
No. 1 boilers, cut to sheets and rings.	14.00 to	14.50
No. 1 railroad cast scrap	29.00 to	29.50
Stove plate and light cast scrap	22.50 to 21.00 to	$23.00 \\ 21.50$
Railroad malleable	20.00 to	20.50
	14.00 to	
Railroad sheet and tank scrap	12.50 to	13,00
	19.50 to	20.00
Railroad grate bars	7.50 to	8.00
Machine shop turnings	14.00 to	14.50
Country mixed scrap	15.00 to	15.50
Horseshoes	23,00 to	23.50
Railroad brake shoes	17.00 to	17.50
initional make silves,	20,00 00	W 4 4 7 7 7

Philadelphia

PHILADELPHIA, Oct. 26.

Though transactions are few and far between, the iron and steel markets show a continued trend toward lower prices. Billets, plates, pig iron and scrap are lower and all other products, with the possible exception of pipe and wire products, are easier to obtain. though price concessions are not so freely made. Plates are now definitely on a basis of 3c., Pittsburgh, and even this price has been shaded, while open-hearth re-rolling billets are available at \$50, Pittsburgh, a \$5 reduction, but sales at this price are not yet reported. Forging billets are offered at \$65, Pittsburgh. In pig iron the principal change is in basic, though Virginia foundry iron is off \$1 a ton. The basic situation has been altered by the offering of iron by Valley furnaces. A sale of 1000 tons has been made at about \$49.50, delivered, but shortly after this transaction more basic iron became available for shipment to this district at \$40, Valley furnace, which is in line with sales made This makes a delivered ennsylvania. The nearest in the Pittsburgh district. price of \$46.16, eastern Pennsylvania. The nearest that any furnace in this district has come to this price was a quotation of \$45, furnace, but the deal was not It is the opinion of iron sellers that no more than \$45, eastern Pennsylvania furnace, could be obtained for basic. In the absence of sales by furnaces in this district the offerings from Valley furnaces have established the level for the Eastern market.

One of the most talked of events of the past few days is the break in coke prices. Eastern furnaces have been offered coke for prompt delivery or on contract at \$12 and \$13, Connellsville, which represent a reduction of about \$4 or \$5 a ton from prices quoted two weeks ago. High coke prices have been giving support to pig iron prices because of the unwillingness of some producers to sell iron at concessions while coke remained so expensive.

Pig Iron.-The effect of the break in coke prices on the pig iron market remains to be seen. Offerings of coke to Eastern furnaces at \$12 and \$13, Connellsville, have not been eagerly snapped up, furnace operators evidently expecting even lower prices. The unwillingness of furnace operators to sell iron at lower prices has been due largely to apprehension over the coke situation. The demand for foundry iron is so small that no real test of prices is afforded, the principal business being in resale lots, most of which are offered from Buffalo. In basic the offering of iron by Valley furnaces at \$40, furnace, or \$46.16, delivered eastern Pennsylvania, fixes the market for this district also, as Valley iron is available for shipment East. Some that has been offered is not yet sold, but a sale of 1000 tons last week, before the \$40 price had been reached, was at \$49.50, delivered. Eastern furnaces have sold no basic in some time, but a quotation of \$45, Eastern furnace, was made to-day for prompt delivery, no sale resulting. Eastern Pennsylvania foundry iron is offered on the basis of \$49 and \$50, furnace, and Virginia iron is down \$1 a ton, having been sold at \$47, furnace. No change has occurred in low phosphorus grades, which remain nominally at \$60 for copper free and \$57 for copper bearing, f.o.b. furnace. A small lot of gray forge was sold at \$48, furnace, and a small lot of malleable at \$51, furnace.

The following quotations are for iron delivered in consumers' yards in Philadelphia or vicinity, except those for low phosphorus iron, which are f.o.b. furnace, but resale foundry iron can be had at about \$2 below these prices:

The state of the s	** ***	Ban and some a	
East. Pa. No. 2 plain, 1.75 to 2.25	\$50.54 to	\$52.54	
East. Pa. No. 2X, 2.25 to 2.75 sil	51.54 to	53.79	
Virginia No. 2 plain, 1.75 to 2.25 sil	52.74 to	53.74	
Virginia No. 2X, 2.25 to 2.75 sil	53.99 to	54.99	
Basic deliv. Eastern Pa	44.16 to	49.50	
Gray forge (nominal)			
Standard low phos. (f.o.b, furnace)			
Malleable	51.50 to	52.40	
Copper bearing low phos. (f.o.b. fur-			
nace)		57.00	

Ferroalloys.—In the absence of transactions it is difficult to quote prices on ferromanganese, but last reported sales were at \$150 to \$160, Atlantic seaboard, for resale. Domestic makers are holding for \$170, seaboard, but no sales are reported. Spiegeleisen is nominally quoted at \$80, furnace.

Semi-Finished Steel.—Open-hearth rerolling billets are available at \$50, Pittsburgh, from Eastern mills, but last sales were at \$55. Forging billets are to be had at \$65, Pittsburgh. There is very little demand.

Plates.—Some mills, which were quoting 3.25c., Pittsburgh, a week ago, are now willing to accept 3c., Pittsburgh, on desirable specifications, but a higher price, probably 3.25c., would be quoted on small lots. At least a part of 6000 tons of tank steel bought by an oil company went at 2.95c., Pittsburgh. A significant development is the willingness of certain mills to quote the same base price on specification plates as on tank or ship steel, whereas until recently different base prices had been usually quoted, specification plates being about \$5 a ton higher, in addition to regular extras. Eastern mills have put in bids on 1300 tons of plates wanted by a locomotive company, and some of these quotations are reported to be 3c., Pittsburgh, or less. Plate mill operations are slowing down, due to lack of business. We quote sheared plates, ¼ in. and heavier, at 3c. to 3.25c., Pittsburgh.

Structural Material.—The market continues extremely quiet, with the price of plain material 3.10c., Pittsburgh. Reports of sales at 3c. are frequent, but generally indefinite and difficult to confirm.

Bars.-While the steel bar market continues easier,

prices have shown no further change, except the reported offering of soft steel by a Pittsburgh district independent at the Steel Corporation price of 2.35c., Pittsburgh. Most of the independent mills are now willing to accept bar orders at 3.25c. Bar iron shows an easier trend, a number of sales having been made at 4.25c., Pittsburgh, and a local mill is quoting 4c. The leading active producer continues its quotation of 4.50c., Pittsburgh, but sales at this price are few. Some railroad orders, however, have been placed at 4.50c. within the past week.

Rails.—Bids have gone in on 100,000 tons of rails wanted by the Pennsylvania Railroad for next year's delivery. These bids, however, cover only the deliveries which the rail mills are able to make, as in no bid, so far as reported, was a price named. In view of the uncertainty as to the Steel Corporation price on rails for next year, the independent mills quoted "price to be determined later." There is no indication as yet whether the business will be allocated by the railroad on this condition.

Old Material.—The prices at which mills in this district can buy scrap show a further decline, most grades having dropped about \$1 a ton in the past week. There is very little business; in fact, the market is almost at the point of complete stagnation. We quote for delivery at consuming points in this district as follows:

No. 1 heavy melting steel	22.00 to	23.00
Steel ralls, rerolling	36.00 to	37.00
No. 1 low phos., heavy 0.04 and under	32.00 to	33.00
Car wheels	40.00 to	42.00
No. 1 railroad wrought	27.00 to	28.00
No. 1 yard wrought	24.50 to	25.50
No. I forge fire	17.00 to	17.50
Bundled skeleton	17.00 to	17.50
No. 1 busheling	20.00 to	21.00
No. 2 busheling	17.00 to	18.00
Turnings (short shoveling grade for		
blast furnace use)	18.00 to	19.00
Mixed borings and turnings (for		
blast furnace use)	17.00 to	17.50
Machine-shop turnings (for rolling		
mill and steel works use)	18.00 to	19.00
Heavy axle turnings (or equivalent)	20.00 to	21.00
Cast borings (for rolling mills)	22.00 to	23.00
Cast borings (for chemical plants)	24.00 to	25.00
No. 1 cast	38.00 to	39.00
Railroad grate bars	29.00 to	30.00
Stove plate (for steel plant use)	26.50 to	27.00
Railroad malleable	27.50 to	28,50
Wrought iron and soft steel pipes		
and tubes (new specifications)	19,00 to	20.00
Iron car axles	35.00 to	37.00
Steel car axles	35.00 to	37.00

Cleveland

CLEVELAND, Oct. 26.

Iron Ore .- Ore shipments for October are expected to show some falling off as compared with September. Many of the lake boats have been diverted to the grain trade this month, and for this reason the ore carriers are getting better dispatch, not being delayed so long at Lake Erie ports to unload cargoes. Deliveries at lake front furnaces have fallen off considerably this month, as the furnace stock piles are well filled up. Consequently the bulk of the ore is being shipped to interior furnaces or is being placed on railroad docks. Some of the interior furnaces are anxious to get shipments on their contracts, but with favorable weather next month it is expected that nearly all consumers will have sufficient ore to carry them over until next spring. understood that the Steel Corporation will continue shipments in good volume until about the close of the season of navigation.

We quote delivered lower Lake ports: Old range Bessemer, \$7.45; old range non-Bessemer, \$6.70; Mesabi Bessemer, \$7.20; Mesabi non-Bessemer, \$6.55.

Coke.—Prices on furnace coke have declined sharply, standard furnace coke for prompt shipment being offered at \$13. Standard Connellsville foundry coke is now being offered at \$15 for the first half and a few contracts have been placed at that price. For prompt shipment \$17.50 to \$18 is being quoted. An Indianapolis by-product plant is offering foundry coke for delivery next year at \$18.50 with a 7½c. a ton reduction for every 5c. a ton reduction on its cost of coal, and has booked considerable business on that basis.

Pig Iron.-Following the report of sales of basic pig iron at \$40 in the Pittsburgh district a northern Ohio consumer has resold a 700-ton lot of basic iron at that price and a local broker is offering basic at \$40. However, some producers declare that they will not meet this price. The market is almost at a standstill. Furnaces are adhering to the \$47 price on foundry iron and report a few small lot sales for immediate shipment at that price. They feel that any reduction in foundry iron prices at the present time would not stimulate the demand. No inquiries have developed for next year. Some resale foundry iron is still coming out, for which consumers are being asked to make One 200-ton lot was sold by a local broker at \$45. With the falling off in the consumption of pig iron some of the furnaces have caught up on old orders and have commenced to pile iron. The situation in this respect is expected to grow worse, as there have been additional suspensions of shipments, mostly by automobile foundries, and no releases by foundries that have held up iron recently. However, an Indiana steel plant has released shipments on basic iron. Low phosphorus iron has declined \$2 a ton, sales being made down to \$56.

We quote delivered Cleveland as follows, based on the new freight rates, these being a 56c. switching charge for local iron, a \$1.96 freight rate from Valley points, a \$3.36 rate from Jackson and \$6.67 from Birmingham:

Basic \$41.96
Northern No. 2 fdy., sil. 1.75 to 2.25 \$46.96 to 48.96
Southern fdy., 2.25 to 2.75. 49.92
Ohio silvery, sil. 8 per cent. 61.36 to 63.36
Standard low phos., Valley furnace. 56.00 to 58.00

Bolts, Nuts and Rivets.—The demand for bolts and nuts has quieted down materially and manufacturers are beginning to catch up slowly on deliveries. Prices are firm. The rivet market is quiet, orders being limited to small lots for early shipment.

Semi-Finished Steel.—Some of the sheet mills are holding up on sheet bar shipments, and there is no new demand for billets and sheet bars. An Ohio mill has quoted \$55, delivered shipboard, on a 2000-ton lot of rerolling billets for England.

Finished Iron and Steel .- Efforts of the automobile manufacturers to secure lower prices on steel have resulted in one mill meeting the price of the Carnegie Steel Co. on forging steel bars that carry an extra over the base price. The volume of new business is very light, and is confined mostly to steel bars. There has been further curtailment of plant operations in the metal working field and operations of some steel plants are being reduced. The McKinney Steel Co. is now operating its steel plant at two-thirds capacity and the United Alloy Steel Corporation at Canton is running five out of 18 open-hearth furnaces. Automobile plants in the Central West are still generally running at greatly reduced capacity, and are using up their inventories, consequently no steel held up by this industry has as yet been released. Independent mills are selling steel bars at 3.25c. to 3.50c., the higher price being for very small lots. Some of the agricultural implement manufacturers have suspended shipments on steel bars purchased at the recent prevailing prices and are asking readjustment of contracts to the present price levels. Plates are very dull, with 3.25c. as the usual quotation, although there are reports of a 3c. price. steel reinforced bars have further declined \$5 a ton to 3.50c. There is no inquiry for structural material, as no new building work is coming out.

Cleveland warehouses quote steel bars at 3.34c. to 3.84c.; plates, 3.64c. and structural material, 3.44c.; No. 9 galvanized wire, 4.70c.; No. 9 annealed wire, 4c.; No. 28 black sheets, 8.50c.; No. 28 galvanized, 9.50c.; No. 10 blue annealed, 6.75c.

Sheets.—Further weakness has developed in the sheet market, particularly on the heavy gages of blue annealed sheets, which some mills are quoting on the plate basis at 3.90c. to 4.20c. base for Nos. 10 and 12 gages. Most sheet mills are quoting blue annealed sheets at 5c. for the heavier gages and 5.25c. for the lighter gages, although a 4.50c. price has appeared. Independent mills quote black sheets at 6c. to 6.50c., and one Valley mill has reduced its price on galvanized sheets to 7.50c. No inquiry has developed to test prices on automobile body sheets, which are still nominally quoted at 7.85c.

Old Material.-Activity in the scrap market is limited to trading between the dealers and is confined almost wholly to sales for immediate delivery. Dealers are buying in small lots only to fill old contracts. Shipments are very slow, as it is very difficult to secure permits for shipments to Cleveland mills and to the Pittsburgh district. The market is weak, but scrap that can be shipped without delay is bringing better prices than material concerning which there is uncertainty about delivery. Quotations on some grades are lower and some others are nominal in the absence of transactions. There is a wide range in quotations on heavy melting steel. One dealer is offering \$25 for this grade for quick shipment, but some has been sold at \$23. For cast borings \$18.65 is being offered, delivered Youngstown. Some busheling scrap has been sold in Cleveland at \$17, but Detroit dealers report sales as low as \$16.50. A sale of railroad malleable is reported at \$31, this grade being weak because the largest local consumer has shut off on shipments.

Dealers quote delivered consumers yards in Cleveland and vicinity, as follows:

Heavy melting steel	\$24.00 to	\$25.00
Steel rails, under 3 ft	27.00 to	28.00
Steel rails rerolling	33.00 to	
Two walls	33.00 10	
Iron rails		
Iron car axles	41.00 to	
Low phos. melting scrap	26.00 to	27.00
Cast borings	16.00 to	16.50
Machine shop turnings	11.75 to	
Mixed borings and short turnings	16.00 to	
Short turnings for blast furnaces	16.00 to	
Compressed steel	21.50 to	22.00
Railroad wrought	27.00 to	27.50
Railroad malleable	30.50 to	31.00
Steel axle turnings	21.00 to	
Light bundled sheet stampings	14.00 to	
Drop forge flashings over 10 in	17.50 to	
Drop forge flashings under 10 in	17.50 to	18.00
No. 1 cast	30.00 to	32.00
No. 1 busheling	17.00 to	18.00
	28.00 to	29.00
Railroad grate bars		
Stove plate	27.50 to	28.00
Cast-iron wheels	39.00 to	40.00
Pipes and flues	22.00 to	22.50

Chicago

CHICAGO, Oct. 26.

The downward tendency of prices is becoming more pronounced in most iron and steel commodities, and those who have been looking forward to a drop in independent mill quotations to the Steel Corporation level are more confident that their expectations will be realized. Owing to the paucity of new business, some mills are still adhering to previous quotations, no doubt feeling that to offer concessions would not necessarily bring out buying, but such inquiries as have appeared have brought decided cuts in some finished materials. On an inquiry for 1000 tons of tank plates for delivery at an Ohio plant, less than 3c., Pittsburgh, has been quoted. There have been numerous rumors as to concessions quoted on structural shapes, and while authentic information is lacking, it is felt that an attractive tonnage offered on the basis of 2.85c, Pittsburgh, for plain material would find plenty of takers among the independents.

In mild steel bars an increasing amount of resale material is appearing which is being offered at the Steel Corporation price and in a few cases for even less. At the same time, some business in bars is still being booked at 3.25c., Pittsburgh, and it is notable that lighter sizes are still in a fairly strong position. Recent sales of sheets for fourth quarter shipment brought out prices of 4.95c., Pittsburgh, for blue annealed and 5.90c. for black. Cancellations of bolts and nuts are nearly as large as new commitments, but the backlog of manufacturers is still comfortable.

The demand for wire products is commencing to fall off and the leading interest has found it possible to abandon the replacement basis of taking new business.

Resale offerings of pig iron are generous and have developed concessions of \$3 under the Northern market and \$2 under the Birmingham market. The leading steel interest has announced that the prices of \$39, furnace, on foundry and \$39.50 on malleable which governed allotments among its customers during the last half of this year will govern on business taken for first quarter by its Bayview plant. The total tonnage avail-

able is relatively small and regular customers are being given the first opportunity to take it. Scrap is soft and

declining.

Rails constitute the outstanding feature of the market, most of the Western roads having arranged for their 1921 requirements at a price to be fixed later. Operating conditions in the district are substantially the same as last week.

Pig Iron.—Business is slow and an increasing amount of resale iron is appearing on the market, concessions on Northern iron being as much as \$3 under furnace quotations and on Southern at least \$2 below the Birmingham prices of producers. Current business is largely confined to small lots involving a few cars, although one inquiry calls for 1000 tons of Southern iron for prompt shipment. One of the largest individual sales of the week was 500 tons of silvery, which was bought at an unnamed concession. While the exact terms of this sale are uncertain, it is known that at least one maker will accept business at \$55, furnace, for 8 per cent, or \$5 under recently ruling quotations. Furnace quotations on low phosphorus have also dropped at least \$3. Coke continues to soften, spot beehive foundry being available at from \$15 to \$16, Eastern ovens. Generally speaking, foundries in this district are curtailing production, although there are numerous exceptions, melters serving the stove and furnace industry being very busy.

The following quotations are for iron delivered at consumers' yards except those for Northern foundry, malleable and steel-making irons, including low phosphorus, which are foll, furnace and do not include a switching charge averaging 70c, per ton.

Superior charcoal, averaging sil Southern coke, No. 2 foundry, sil. 2.25 to 2.75.

Southern foundry, sil. 1.75 to 2.25.

Malleable not over 2.25 sil.

Basic

Low phos. (copper free).

Silvery, 7 per cent.

Ferroalloys.-Both ferromanganese and spiegeleisen have been rendered soft by the appearance of resale material. It is reported that 100 tons of resale spiegeleisen was sold at \$58.75 f.o.b. shipping point, but verification is lacking. Ferromanganese is said to be available at as low as \$150, seaboard. Producers' quotations remain nominally the same.

We quote 75 to 80 per cent ferromanganese, seaboard, \$165 to \$170: 50 per cent ferrosilicon at \$85, delivered; spiegeleisen, 18 to 22 per cent, \$80 to \$85 furnace.

Plates .- The trade has been disappointed in its expectation that an announcement of the Steel Corporation's price policy would be made during the past week. There seems to be little ground for the rumor that advances in any of the finished products are to be looked for, as was recently forecast in some quarters. Independent quotations on tank plates are still nominally 3.25c., Pittsburgh, but it is felt concessions would be made if attractive business were in sight. There is also an increasing belief that if the market does not soon emerge from its present lethargy, independents will find it necessary to meet the price of the leading interest. High costs, in such a case, would be an obstacle for the operating departments to overcome through such devices as they can command. New business in plates is light, although some good sized tonnage involved in tank vessel, pipe line and car construction work are still pending. The idle plate mill of the leading local independent has not resumed operation, the work of increasing its capacity still being in progress.

The mill quotation is 2.65c, to 3.25c., Pittsburgh, freight to Chicago being 38c. per 100 lb. Jobbers q 3.78c. to 4.28c. for plates out of stock.

Structural Material.-Speculation is rife as to what extent independents will make concessions to secure new business. Reports are now afloat, although without confirmation, that independent quotations have been made on the steel involved in the local Federal Reserve bank at figures below the recent minimum of 3c., Pitts-burgh, on plain material. The steel involved amounting to close to 9000 tons, is of attractive proportions. whether the leading interest's prices can be met will depend on the ability of independents to adjust their costs. It is unofficially reported that the general contract for the bank has been let to the John Griffiths & Son Co., Chicago, and that the low fabricating bids were less than \$100 per ton. The letting of the work regardless of the terms is expected to give new impetus to construction activity in this vicinity. In this connection it is worth noting that labor after a long period of slack work is expected to prove more tractable than before. Bids were received last week on the California Avenue bridge, Chicago, involving 1500 tons, but no award has yet been made. Recent lettings include:

Commonwealth Steel Co., finishing building, Granite City,

111., 326 tons, to Decatur Bridge Co. Shasta Zinc & Copper Co., bag house at Pitt. Shasta County, Cal., 320 tons, to Kansas City Structural Steel Co. Bridge across Snake River, Walters Ferry and Grand View, Idaho, 321 tons, to Minneapolis Steel & Machinery Co. Federal Telegraph Co., two steel towers, San Francisco,

120 tons, to Pacific Rolling Mill Co. Milwaukee Boiler Mfg. Co., boiler and tank shop, Milwaukee, 150 tons, to Wisconsin Bridge & Iron Co.

Molochs Stoker Co., first unit works, Kaukauna, Wis.,

100 tons to Wisconsin Bridge & Iron Co. Inquiries include:

Union Liberty Furniture Co., building, Chicago, 500 tons. High school, Fort Dodge, Iowa, 120 tons. Structural steel skeleton for reinforced bridge, Laredo,

Tex., 400 tons.

The mill quotation is 2.45c. to 3.10c., Pittsburgh, takes a freight rate of 38c. per 100 lb. for Chicago d Jobbers quote 3.58c, to 4.08c. for materials out of war

Sheets.-A purchase of about 2500 tons of sheets for fourth quarter delivery has been made on the basis of 4.95c., Pittsburgh, for blue annealed and 5.90c. for black. It is also reported that 5000 tons, exclusively of blue annealed was bought at 4.95c. base, Pittsburgh. Neither the leading interest nor the foremost local independent factors in the market are booked ahead beyond the first of the year.

Mill quotations are 4.35c. to 5.90c. for No. 28 black; 3.55c. to 4.95c. for No. 10 blue annealed, and 5.70c. to 7.75c, for No. 28 galvanized, these all being Pittsburgh prices, subject to a freight to Chicago of 38c. per 100 lb. The lowest prices are those of March 21, 1919.

Jobbers quote: Chicago delivery out of stock, No. 10 blue annealed, 7.13c.; No. 28 black, 8.10c.; No. 28 galvanized, 9.60c.

Bars .- Several thousand tons of mild steel bars representing surplus stocks of manufacturers in this territory, principally in the tractor and automotive field, are being offered for resale at the Steel Corporation price and in a few cases for even less. One lot alone amounts to 1500 tons. Despite this development, independents are still adhering to a minimum quotation of 3.25c. base, Pittsburgh, although new business is admittedly light. Existing bookings in small sizes of bars are still much larger than in the heavier, and recessions from the present ruling market, if made, are expected to take place in the latter class of material first. A current inquiry calling for 2000 tons of bars for early shipment comes from Holland. In general, however, inquiry is small. Bar iron mills are booked ahead for about 60 days and give no indication of reducing prices, although new business is not so heavy as a month or New commitments in rail-carbon steel bars two ago. are light.

Mill prices are: Mild steel bars, 2.35c. to 3.25c., Pittsburgh, taking a freight of 38c. per 100 lb.; common bar iron, 2.75c. to 4c., Chicago; rail carbon, 3.75c. mill.

Jobbers quote 3.48c. to 3.98c. for steel bars out of warehouse. The warehouse quotation on cold rolled steel bars is 5.90c. for rounds and 6.40c. for flats and squares, an extra of 15c. per 100 lb. applying to orders exceeding 1000 lb. and under 2000 lb. and an extra 35c. on orders up to 1000 lb.

Jobbers quote hard and medium deformed steel bars at 4.63c. base.

Railroad Rolling Stock .- Recent activity in the railroad car market has been concentrated largely in the East. The Seaboard Air Line is inquiring for 1000 ventilated box cars, 350 hopper cars, 300 phosphate cars and 250 flat cars. The Southern wants 2500 box cars of 40 tons capacity. The Atlantic Coast Line is in the market for 100 phosphate cars. The New England Fuel & Transportation Co. is inquiring for 500 to 600 70-ton hopper cars. The Carolina, Clinchfield & Ohio wants 100 flat and 100 gondola cars, and the Western Maryland 150 hopper cars. The Goodyear Tire & Rubber Co. is inquiring for 100 to 150 gondola cars. The El Paso & Southwestern ordered 75 10,000-gallon tank cars from the General American Tank Car Corporation.

Wire Products.—Demand is commencing to show signs of falling off, and this is particularly true in the South, which has been demoralized by the decline in cotton. New commitments are still generous in wire nails and plain wire and barbed wire is in fair demand but inquiry for fencing has fallen off. The leading interest has finally reached a point in production which has justified an abandonment of the replacement basis of taking new business. Independents still have fairly comfortable bookings and while they have not reduced prices, they have in some cases indicated a disposition to shade to secure attractive orders. For mill prices, see finished iron and steel, f.o.b. Pittsburgh, page 1161.

Bolts and Nuts.—Cancellations, coming largely from the tractor and automotive industries, are nearly as heavy as new commitments. At the same time, most bolt and nut manufacturers still have comfortable hookings ahead. For prices, see finished iron and steel, f.o.b. Pittsburgh, page 1161.

Jobbers quote structural rivets, 5.08c. to 5.73c.; boller rivets, 5.18c. to 5.83c.; machine bolts up to $\frac{8}{8}$ x 4 in., 20 per cent off; larger sizes, 10 off; carriage bolts up to $\frac{8}{8}$ x 6 in., 10 off; larger sizes, 5 off; hot pressed nuts, square tapped and hexagon tapped, list price plus \$1.15; blank nuts, list price plus, \$1.15; coach or lag screws, gimlet points, square heads, 30 per cent off. Quantity extras are unchanged.

Old Material.—Further declines in prices have developed, although few sales, principally of busheling, have been made to consumers within the past week. There has also been a little buying of stove plate and an inquiry for about 2000 tons of malleable is before the trade. Purchases on the whole involve limited quantities and are no doubt being made to round out user's existing stocks. Railroad offerings are generous and include the Baltimore & Ohio 8000 tons, the Burlington 4500 tons, the Rock Island 2500 tons, the Santa Fe 2200 tons and the Grand Trunk Western 1500 tons.

We quote delivery in consumers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

and a residue contract contract break, and	TOTTOMO
Per Gross Ton	
Iron rails\$33.00 to \$	\$33,50
Relaying rails 57.50 to	62.50
Car wheels 34.00 to	34.50
Steel rails, rerolling 30.50 to	31.50
Steel rails, less than 3 ft 23.00 to	23.50
Heavy melting steel 20.00 to	20.50
Frogs, switches and guards, cut apart 20.00 to	20.50
Shoveling steel 19.50 to	20.00
Low phos. heavy melting steel 25.00 to	25.50
Drop forge flashings 17.00 to	17.50
Per Net Ton	
	20.00
Iron angles and splice bars 31.50 to	32.00
Steel angle bars	19.50
Iron arch bars and transoms 32.50 to	33.00
Iron car axles 39.00 to	39,50
Steel car axles 31.50 to	32.00
No. 1 busheling 17.50 to	18.00
No. 2 busheling 10.00 to	11.00
Cut forge 18.00 to	18.50
Pipes and flues 13.50 to	14.00
No 1 railroad wrought 1900 to	10.50

UIL IUISC	10.00 10 10.00
Pipes and flues	13.50 to 14.00
No. 1 railroad wrought	19 00 to 19.50
No. 2 railroad wrought	18.00 to 18.50
Steel knuckles and couplers	21.00 to 21.50
Coil springs	
No. 1 cast	
Boiler punchings	21.00 to 22.00
Locomotive tires, smooth	
Machine shop turnings	8.00 to 8.50
Cast borings	11.00 to 11.50
Stove plate	24.00 to 25.00
Grate bars	
Brake shoes	21.00 to 21.50
Railroad malleable	22.00 to 22.50
Agricultural malleable	22.00 to 22.50
Country mixed	13.00 to 14.00

Rails and Track Supplies.—Most of the railroads in this territory have either made reservations or closed contracts for their 1921 rail requirements. The contracts do not stipulate a price and in most cases permit a reduction of the tonnage specified if an advance takes place. A large tonnage of track fastenings supplemen-

tary to the rails has been arranged for. Among recent rail reservations with the local mill are 40,000 tons for the Chicago & North Western and 10,000 tons for the Omaha. There is a fair amount of new business in track bolts and spikes for early shipment. The leading interest's bookings in light rails are about equal to output.

Standard Bessemer rails, \$45 to \$55; open-hearth rails, \$47 to \$57. Light rails, 2.45c. to 3.50c., f.o.b. makers' rails. Standard railroad spikes, 3.35c. to 4c., Pittsburgh. Track bolts with square nuts, 4.60c. to 5c., Pittsburgh. Steel the plates, 3c. to 4c. and steel angle bars, 2.75c., Pittsburgh and Chicago; tie plates, iron, 3.75c. to 4c., f.o.b. makers' mills.

Cast Iron Pipe.—River Rouge, Mich., has rejected bids on 250 tons of pipe. Gothenberg, Neb., has awarded 100 tons to the National Cast Iron Pipe Co. The market is without other feature.

We quote per net ton f.o.b. Chicago, ex-war tax as follows: Water pipe, 4-in., \$58.10; 6-in. and above, \$83.10; class A and gas pipe, \$4 extra.

British Steel Plants Closing

Business at a Standstill—Unemployment Problem Serious—Minimum Price for Tin Plate

(By Cable)

. LONDON, ENGLAND, Oct. 25.

There is a more hopeful feeling on the part of labor, but in the meantime more works are closing and business is stagnant. A complete cessation of productive operations is in sight, and in any event the unemployment problem is serious. Government proposals include the utilization of additional men in foundries, puddling works and railroad car building. There is also an anti-dumping bill pending.

Parcels of Belgian pig iron are arriving here. The foreign iron ore market is stagnant and there is no chartering of vessel space. The best Rubio ore is nominally quoted at 50s., ex-ship Tees.

Japan is inquiring for German steel bars and wire, and South America has placed some small business for wire. Tin plate makers are discussing a minimum price, but it is doubtful if this will be acceptable. Mills are generally closed and the market is dull with little inquiry. The galvanized sheet market is weak.

We quote per gross ton except when otherwise stated, f.o.b. maker's works, with American equivalent figured at \$3.48 for £1, as follows:

Ship plates	£26	0 to	£33	0	\$99.48 to	\$114.44
Boiler plates			35	0	104.40 to	121.80
Tees			31	0	92.22 to	107.88
Channels				5	89.61 to	105.27
Beams		10 to		0	88.74 to	104.40
Round bars, % to 3 in	28	0 to	33	0	97.44 to	114.44
Rails, 60 lb. and up	25	0 to	27	0	87.00 to	93.96
Billets	20	0 to	21	0	69.60 to	73.08
Sheet and tin plate bars,						
Welsh	21	0			73.08	
Galvanized sheets, 24 g	37		38	0	128.76 to	132.24
Black sheets, 24 g. to 26 g.	50	0 to	54	0	174.00 to	187.92
Tin plate base box*	2	3			7.48	
Steel hoops	38	15 to	39	0	134.85 to	135.72
Cleveland basic iron					40.89	
West Coast hematite	15	15			54.81	
Cleveland No. 3 foundry		5			39.15	
Ferromanganese		0 to	40	0	121.80 to	139.20
Coke		2 3/4			10.92	

^{*}Prompt delivery; for January, 47s. (\$8.18).

French Export Duty on Scrap

Washington, Oct. 26.—Commercial Attache Huntington at Paris cables that the French Government has imposed an export duty of 150 francs per 1000 kilos on scrap iron fit only for remelting. Its exportation is prohibited except under license. The embargo on the exportation of foundry pig iron and forge pig containing less than 15 per cent of manganese and spiegel iron containing from 15 to 25 per cent of manganese has been removed.

BELGIAN MATERIAL OFFERED

German Competition Evident in Machinery Trade — Japan Reaches Low Price Level of June

Conditions in export trade show but little change over those prevailing for several months. Light buying for immediate needs continues from South American markets and from the Dutch East Indies, but Europe is still restrained by the adverse exchange. According to many export companies with connections in South American cities, European competition is becoming more of a factor in trade with the Latin American republics. Belgian producers have even offered material to American exporters for this and the Far Eastern trade. One of these offers of 1000 tons of 1/4-in, steel bars was 1235 francs, c.i.f. Buenos Aires, or 1380 francs, c.i.f Soerabaya, Dutch East Indies. The best delivery promised, however, was from three to four months. Competition from Germany appears from time to time in the machinery field. As an example of this, a 10ton. 49-ft. span overhead traveling crane for the Dutch East Indies was recently placed in Germany, after bids had been received from several large crane manufacturers in the United States.

Exporters generally do not expect any great increase of business from British buyers because of the present strike, as fuel scarcity will hamper transportation from the ports and may force many consumers of iron and steel to suspend.

Japanese conditions are generally unchanged. The downward trend of prices, aided by the numerous forced sales of material by banks unable to collect from the buyer, on Oct. 22 reached the low level of last June. Pig iron, which has been generally unaffected by price fluctuations, has recently dropped from 95 yen per ton to 90 yen. Sales to Pacific Coast consumers have fallen off during the past two months. A number of the small iron and steel plants in Japan have begun laying off workmen and some are preparing to suspend indefinitely. The larger mills, assisted by the government, are operating. A large government iron works in Korea is said to be operating at a loss and will probably be temporarily closed, owing to transportation costs and prevailing low prices.

Decline in Exports from Seattle and Tacoma

Exports of iron and steel products from Seattle and Tacoma, Wash., have shown a steady decline for several months. The latest available statistics on exports to the Orient from these ports are for July of this year. They were compiled by the foreign trade bureau of the Seattle Chamber of Commerce and the Commercial Club.

Total exports of scrap amounted to only 358 gross tons, chiefly to Japan and China. Iron bars totaled 358 gross tons, of which the greater part was shipped to Canada and the Philippines. The heaviest shipments recorded for the month are in steel bars and rods and wire rods, sent chiefly to Japan and amounting to 12.884 gross tons. Billet exports dropped to about 215 gross tons, 84 tons going to Canadian buyers and about 131 tons to Japan. Canada led in receipts of bolts and nuts, receiving 123 tons out of a total exportation of 161 gross tons.

Japan was by far the largest buyer of cast iron and wrought iron pipe, of which about 506 gross tons was exported to Canada, China, Japan and the Philippines. Railroad material shipments, according to these statistics, had shrunk to 157 gross tons in July. In cargoes of ship and tank plates Scotland was the leading buyer, receiving the greater part of the 2,687 gross tons shipped during the month. Of the 1,011 gross tons of structural steel exported, China was first with 494 gross tons, followed by Canada with 308 tons and Hong Kong and Japan together with only 209 gross tons. Although Japan is usually a large buyer of tin plate, shipments of this material totaled only 51 gross tons, against 380 tons to Canada.

GERMAN PRICES DROP

Cut in Finished Products by Iron Industry Union

A dispatch from Berlin, Germany, Oct. 25, reports a 14.1 per cent cut in bar iron effective for four months, made by the Iron Industry Union, the statecreated trust governing the German output of pig iron, semi-finished steel and forms of finished product. Bar iron in May, 1920, was put at 3650 marks per metric ton, and then it was reduced in June to 3200 marks, in July to 2840 marks and now to 2440 marks, this last price representing a reduction of 14.1 per cent. Other forms of finished and semi-finished products have apparently also been cut, but pig iron remains at the last figures of 1610 marks for steel making iron to 1910 marks for hematite iron. Pig iron makers through the depreciation of exchange pay more for imported ore, and claim in effect that they are suffering a reduction. The announcement of a fourmonths' period of application for the prices is counted on to induce consumers to place new orders.

Building Plans of Columbia Steel & Shafting Co.

The Columbia Steel & Shafting Co. has purchased a 40-acre tract on the Ohio River, just north of Ambridge, Pa., on the Ft. Wayne division of the Pennsylvania Railroad. The site is that upon which the Ambridge Steel Co., formed in July, 1919, but subsequently dissolved, had planned to erect a plant for the making of strip steel. Building trade conditions permitting, the Columbia Steel & Shafting Co. proposes to construct a plant, the main building of which will be 600 x 630 ft., or approximately eight and one-half acres, to be strictly fireproof, and will include facilities which will permit the company to more than double the present productive capacity of its plant at Carnegie and Rankin, Pa. The general offices of the company now located at Carnegie, Pa., will be removed to Ambridge and housed in a threestory building, 60 x 200 ft., fronting on Duss Avenue (Lincoln Highway).

It has not been definitely decided whether the present plants of the company will be continued as manufacturing units. The facilities at the new plant will enable the company to supply the full range of sizes, shapes and grades of cold finished steels, and it is also probable that at some future date it will install heating furnaces and a bar mill for making its own hot-rolled bars. The property has a frontage on the Ohio River of about 1000 ft., which will be improved for the purpose of handling coal and raw material shipments.

The American Bridge Co. has launched at its Ambridge, Pa., works, the last barge of an order for seven for Standard Oil Co. of Louisiana. The barges are 275 ft. long, 52 ft. wide and 8 ft. deep. The barge just launched will be towed to the Pennsylvania works of the National Tube Co. and loaded with pipe for New Orleans. The American Bridge Co. also has completed six of the 40 barges ordered by LaBelle Transportation Co., a subsidiary of LaBelle Iron Works, Steubenville, Ohio, and has five more on the ways.

The Division of Manufacturers of the Cincinnati Chamber of Commerce is conducting a referendum on the establishing of the open shop plan among the workers of all industries. The replies received to date indicate that the manufacturers of the city are practically unanimously in favor of the open shop.

The Standard Tank Car Co. has received an order for \$300,000 worth of tank cars. At normal capacity the company's plant at Sharon, Pa., can turn out 25 cars a day.

TOOL STEEL DULL

Demand Declines, But No General Price Cutting is Reported

The demand for tool steel has slumped off materially as a result of the slowing down in the automotive industries and some of the mills are hungry for business, but apparently there has been no general price cutting as yet. High-speed steel is somewhat irregular in price, quotations ranging from \$1.20 and \$1.25 per lb. down to \$1.10 or possibly lower.

At present, and in fact at almost all times since the war, the American tool steel manufacturers have had the American market pretty much to themselves, English competition not being the important factor it was prior to the war. A great many American users now prefer the domestic brands and have gotten away from the English makes. This condition was brought about largely by the fact that when England was unable to ship its normal volume of tool steel to this country, because of war needs at home, it devolved upon American makers to increase their output to meet the American demand. Thus, many consumers who had hitherto used English steel almost exclusively found the American substitute entirely satisfactory and have continued their use in post-war days.

Some American manufacturers admit, however, that the dangers of English competition are not over, and that England may again become a more important competitor for business here when manufacturing conditions in that country have again become normal. There are stocks of English tool steel in this country which occasionally are offered to the consuming trade at low prices. Some of this product runs 5 to 14 per cent in tungsten, as compared with 17 to 18 per cent in high-speed steel, and is selling at 80 cents to \$1 per lb.

Last spring the British high-speed tool steel manufacturers found themselves facing an acute shortage of vanadium, 90 per cent of the supply of which is controlled by the Vanadium Corporation of America, with mines in Peru. The Vanadium Corporation has recently promised to increase the allotment to British producers, having previously been unable to accede to their demands, claiming that the heavy mining of the

alloy during the war weakened the mines, causing some cave-ins, and that it has been giving American consumers preference.

The Tungsten Bill

At the next session of Congress it is quite likely that action will be taken on the so-called "tungsten bill," introduced by Congressman Timberlake of Colorado. Primarily the Timberlake bill was fathered to give tariff protection to mining companies which are unable to mine profitably the tungsten ore deposits in this country in competition with the cheaper labor and other costs in China and Burma, where most of the tungsten ore originates. The bill provides for a tariff of \$9 per unit of tungstic trioxide, a unit being defined as 1 per cent of a short ton of 2000 lb., or 20 lb. The bill also provides for a tariff of nine-tenths of one cent per lb. of contained tungsten on metallic tungsten, tungsten powder, ferrotungsten, ferrotungsten powder, scrap steel containing tungsten fit only to be manufactured; commercial tungstic acid, calcium tungstate and all other salts of tungsten and other manufactured materials containing tungsten (except high-speed tungsten steel and all alloy steels containing tungsten), and all other compounds containing tungsten.

On high-speed tungsten steel and all alloy steels containing tungsten there shall be levied a tariff of 35 per cent ad valorem. There is no mention in the bill of tools made from steel containing tungsten; therefore this feature of the bill has caused widespread alarm in the American tool steel industry.

The principal objections to the bill came from manufacturers of small tools, who claim that no protection is given them. There seems to be no doubt that the bill will be revised to meet the views of the entire industry. As it stands the bill would, according to some in the trade, permit small tools of foreign make containing tungsten to come into this country at prices so low that American manufacturers would be unable to meet the competition.

The purpose of the proposed tariff is to make the United States self-contained in the matter of tungsten ore, but it is claimed by some opposing the bill that the American deposits of tungsten ore will be exhausted in a few years, if worked consistently, and that at the end of that time this country will again become dependent on foreign ores unless new deposits should be discovered here.

EXPORT FINANCING

Plan Indorsed by American Bankers' Association Convention

WASHINGTON, Oct. 26.-Formal launching of a plan for a \$100,000,000 export financing corporation was one of the outstanding events of the annual convention of the American Bankers' Association held during the past week in Washington. While the organization will not take part officially in the organization of the corporation, the association by formal resolution approved the plan as worked out by its Committee on Commerce and Marine. The president of the association was authorized to issue a call for a meeting of bankers and business men to take the necessary steps for the incorporation of the company under the terms of the Edge Assurance has been given of the co-operation of the Chamber of Commerce of the United States and the National Foreign Trade Council. Each of these organizations will give its support to the movement without actually participating in the financing of the corporation.

Another Edge law corporation also was launched during the week. This was promoted by bankers of Southern States who felt that there is a need of a corporation to finance the exports of Southern products. While chief consideration will be given to the financing of sales of cotton abroad all products of the South will be given attention.

Resolutions adopted by the American Bankers' Association commend the credit and deflation policies of

the Federal Reserve Board and oppose suggestions of agricultural producers to utilize the resources of the Federal Reserve system to maintain prices.

Immediate revision of revenue laws is urged in the resolutions. Repeal of the excess profits tax and the substitution of "a more just and certain tax" is declared to be essential. Revision of the income surtaxes also is requested. It is proposed that a joint tax commission be formed by representatives of such organizations as the Chamber of Commerce of the United States, the National Association of Manufacturers, the National Association of Credit Men and others with the American Bankers' Association.

The new transportation act is approved but a recommendation is made that it be amended so that bankers and business men, regardless of their dealings with railroads, can serve on railroad directorates, being charged with full responsibility in connection with their duties in that capacity.

Labor is called upon to abandon the economic fallacy that greater prosperity can be obtained through the reduction of output.

The resolutions brand as "a proven economic, political, and social fallacy," the agitation for the so-called nationalizing of industry. Complete disapproval is expressed of the Plumb plan for nationalizing the railroads.

The plant of the Timken Roller Bearing Co. at Columbus, Ohio, has been closed down indefinitely, the shutdown being attributed to the general slump in the automobile industry.

OUIET ON THE PACIFIC

Steel Being Offered at Low Prices on the Coast-Jobbers Are Cautious

SEATTLE, Wash., Oct. 20.—General industrial conditions in the Seattle district continue quiet, and local representatives of Eastern steel companies do not look for betterment in the situation before Jan. 1. No large work is in sight here that will require any considerable quantities of steel, and the export inquiry is less than at any time for many months. All the local shipyards have a good deal of material left over from their former operations, or else it has been bought up by dealers, and in most cases, when small orders for plates, bars or other material do come in the market, this demand can be easily met from local stocks. There is still a can be easily met from local stocks. There is still a considerable scarcity in some lines of steel, notably in wire products, small sizes of pipe, in sheets and in general building materials.

Pacific Yards Busy

While there is not much activity in the Seattle shipyards, it is said the yards on the Pacific coast are busy, and have a good deal of work ahead. Contracts lately placed with Pacific coast yards include two 10,000-barrel steel tankers with the Union Construction Co., Oakland, and three of similar size with the South Western Ship Building Co., San Francisco, both the orders being placed by the Anglo-Saxon Oil Co., Ltd. For these five boats there will be needed about 13,000 tons of plates, and about 7000 tons of shapes, all this material to go to mills of the Steel Corporation, providing they can make the delivery wanted. Shipment will be made either from Birmingham or Chicago mills. There are five large oil companies operating on the Pacific coast, these being the Standard Oil Co., the General Petroleum Co., the Union Oil Co., the Associated Oil Co., and the Shell Oil Co. All these large interests are placing new boats right along, affording a large amount of work to the Pacific coast yards, which are said now to be well filled up for a year or

Plates at 3c., Pittsburgh

Local representatives of Eastern plate mills say that while the 3c., Pittsburgh, price on sheared plates of tank quality, ¼-in. and heavier, is not common by any means, yet they believe that if any large local business were coming up, and it was offered to the mills at this price, it would not be turned down. Plates are being offered here for this year delivery, and advices are that the Eastern plate mills are more anxious for business than they have been in some months. applies also to sheets, on which fairly prompt shipments can be made, and on which lower prices are being named. The larger jobbing houses here are slow in the matter of placing new business with the mills, saying the demand from their customers is limited, and they anticipate still lower prices.

The Pacific Car & Foundry Co. reports that it is now employing about 600 men at its Renton, Wash., shops, and has considerable work ahead. This company builds a standard type of logging car for which it is having a fair demand. Its price on this car for some time has been \$1,825, but if there should come further declines in steel prices, the company will make corresponding reductions in price on its products. At its Portland, Ore., shops the company is employing about 350 men, having a large amount of repair work on hand, and is also building at the Portland shops 45 cabooses for the Union Pacific Railroad. From its Renton shops the company is shipping an average of three refrigerator cars per day to the Pacific Fruit Exchange, these applying on an order for 200, taken by the company some time ago.

Exports Decline

Seattle is not alone in its falling off in exports, figures just issued showing that there has also been a large falling off in exports at San Francisco. These figures show that the exports for August from that city totaled \$13,878,683, while in July they were \$20,284,731. In August, 1919, they were over \$20,000,000.

The Stauffer Chemical Co., San Francisco, has announced that it will build a large plant on the Duwamish waterway near Seattle, for the manufacture of sulphuric acid, and to cost about \$250,000.

Edgar N. Gott, vice-president and treasurer of the Boering Airplane Co., a Seattle industry, states that his company has just been awarded a contract by the Government for the manufacture of spare airplane parts, which will be built in the plant of the company here, and will be for use on the S. E. 5A airplanes. These machines were purchased by the U. S. Government from Great Britain at the end of the war and are used as Army machines.

STEEL CORPORATION EARNINGS

Report Shows Comfortable Increase Over Second Quarter-Usual Dividend

The report of the United States Steel Corporation for the third quarter of 1920 shows that the net earnings were the largest since the second quarter of 1918, when they were \$62,657,391. The earnings for the third quarter of 1920 were \$48,051,540, compared with \$40,177,232 for the third quarter of 1919. July was the month of largest earnings for the past quarter, but the earnings for September were not far behind. The the earnings for September were not far behind. net earnings for the first three quarters of 1920 and for the three preceding years have been as follows:

Quarters	1920	1919	1918	1917
Second	.\$42,089,019 . 43,155,705 . 48,051,540	34,331,301	\$56,961,424 62,557,391 42,961,589 36,354,165	\$76,756,Q18 90,579,204 68,243,784 59,724,125
Net earning each yea	gs r	\$143,813,219	\$198,834,569	\$295,303,131

The usual dividends of 1% on preferred and 1% on common were declared. The statement of the earnings for the quarter ending Sept. 30 is as follows:

8	
Less: Interest on the subsidiary companies bonds outstanding \$699.918 697.968 695.875	Balance of earnings \$16,436,802 15,440,416 16,174,322
	. \$48,651,540 . 12,312,403
U. S. Steel Co	r-
	\$30,524,639
	Less: Interest on the subsidiary companies bonds outstanding \$699.918 697.968

Triple Damages

The principle of awarding triple indemnity in favor of a minor employed without a labor permit who is injured at work, as a measure to assist the enforcement of child labor laws, was upheld by the Supreme Court of Wisconsin in denying the appeal of two Wisconsin corporations which appealed from the decisions of the Industrial Commission. The two actions comprised test cases involving the power of the Industrial Commission to assess triple damages for the employment of a minor without a permit. The Wisconsin child labor law provides that minors under seventeen years of age cannot be employed without a labor permit; the Wisconsin workmen's compensation law provides that in case of injury to a minor employed without a permit the commission shall assess damages in a sum equivalent to three times the indemnity provided by the law for injuries to adults. The principle of assessing triple damages for injury to a minor under seventeen employed at a forbidden machine was upheld by the Supreme Court in a previous case.

Non-Ferrous Metals

The Week's Prices

		New Yor			Deliver	Zinc			
October	Lake	Electro-	New York	New York	St. Louis	New York	St. Louis		
21	15.75 15.75 15.50	15.75 15.75 15.50	$40.00 \\ 39.25 \\ 39.00$	7.05 7.00 7.00	6.75 6.75 6.75	7.50 7.50 7.50	7.20 7.15 7.10		
23	15.50 15.25	15.50 15.25 15.25	39.50	7.00 7.00 7.00	6.75 6.75 6.75	7.50 7.50 7.50	7.10 7.10 7.10		

NEW YORK, Oct. 26.

Business in all of the markets continues exceedingly light and prices in all but tin have further declined. Demand for copper has not improved and quotations have fallen nearly 1c. per lb. The tin market is stronger as to values, but demand shows very little improvement. The lead market is exceedingly dull and prices are lower. The zinc market is practically unchanged so far as demand is concerned and prices are easier. Antimony is stationary.

New York

Copper.—Offerings of copper by various sellers have continued to appear, resulting in a further decline in values until both electrolytic and Lake copper are available at 15.25c. to 15.50c., New York, and it is possible that this could be shaded in some cases. There was a temporary increase in buying about the middle of last week by some consumers, but this has disappeared so that the volume of business is exceedingly light. Some of the large producers are meeting the downward trend and it is probable that a desirable order could be negotiated for at least 15.25c., New York, for either grade. There is no question that there is a large surplus and it is exceedingly likely that the policy of most large producers will result in a further curtailment of production.

Tin .- Since the low point was reached in the tin market in London a week ago, as the result of the coal strike, there has been a marked advance which was quite pronounced to-day, the quotation for the various brands advancing around £7 per ton in each case and the final values being nearly £17 higher than a week ago. To-day spot standard tin was quoted at £258 10s. per ton as against £241 15s. a week ago, with future standard to-day at £263 10s, against £247 10s. a week ago and with spot Straits at £260 against £243 15s. last Tuesday. This increase is regarded as signifying a favorable turn in the British labor situation. In this market a fair business was done in a quiet way last week with dealers the predominant buyers, but there is no snap to the market. Demand has fallen off. evident reason for the buying by dealers was probably that tin is considered cheap under 40c., New York where it has ruled for some days. On the New York Metal Exchange something like 150 tons has changed hands in the last four days, there having been two sales of 25 tons each of spot Straits under the rule at 39.55c. and 39.30c., with sales of future shipment ranging from 39.75c. on Oct. 22 to 40.50c. on Oct. 25. The quotation to-day for spot Straits is 40.25c., New York, which is an advance over the quotation of 38.25c. a week ago. Arrivals thus far this month have been 1700 tons, with 5025 tons reported afloat.

Lead.—The market has eased off slightly and continues inactive. Domestic lead in the outside market is available at 7c., New York, and has sold at this level, the St. Louis quotation being 6.75c. The imported metal is considerably less of a factor than formerly because the cost of importation is now higher than 7c. seaboard, although some lead from this source is offered at 7c. on dock, duty paid. The general demand for the metal from any source is very light. The quotations of the leading producers is still 7c., St. Louis, and 7.25c., New York.

Zinc .- The market continues lifeless and, as a re-

sult of light offerings, values have eased off slightly to 7.10c., St. Louis, for domestic prime Western. Sales are confined to the immediate needs of consumers and producers continue to maintain a waiting attitude. Prime Western, sold for export and reshipped to this market, is still available in limited quantities at 7.50c., New York, or seaboard, but transactions of this nature have tapered off in the last few weeks until they are almost negligible. We quote the New York market as based on imported metal at 7.50c., New York.

Antimony.—Wholesale lots for early delivery are quoted at 6.50c. to 6.75c., New York, duty paid.

Aluminum.—The leading interest maintains the quotation for virgin metal, 98 to 99 per cent pure, unchanged at 32.90c. f.o.b. producer's plant. The same grade of metal from other sources and largely foreign is held at 28.50c. to 29.50c., New York.

Old Metals.—Business is at a standstill. Prices are declining daily and buyers are not inclined to take on material at any figure. Dealers' selling prices are about as follows (all quotations are strictly normal):

	Cents
	Per Lb.
Copper, heavy and crucible	15.00
Copper, heavy and wire	14,00
Copper, light and bottoms	12.50
Brass, heavy	10.50
Brass, light	7.50
Heavy machine composition	15.00
No. 1 yellow rod brass turnings	
No. 1 red brass or composition turnings	12.50
Lead, heavy	. 6.25
Lead, tea	5.00
Zine	

Chicago

Oct. 26.—Prices have reached bottom in the opinion of an increasing number of buyers, and while inquiries are numerous the tight money situation is limiting purchases. Copper, lead and spelter are particularly favored at present quotations. All three metals are lower than a week ago. Tin has advanced 2c. because of events across the water. It is apparent that tin was at a very low point, in fact under the pre-war 5-yr. average, and that the decline in the foreign markets was more than discounted in this country. Future tin is regarded as a good buy at the present level. There have been no changes in old metal prices. We quote Lake copper at 17c. in carload lots; tin, 42c.; lead, 7c.; spelter, 7.25c.; antimony, 8.50c. to 9c. On old metal we quote copper wires, crucible shapes, 10.50c.; copper clips, 10.50c.; copper bottoms, 9.50c.; red brass, 10.50c.; yellow brass, 7.50c.; lead pipe, 5.25c.; zinc, 4c.; pewter, No. 1, 20c.; tinfoil, 27.50c.; block tin, 30c.; all these being buying prices for less than carload lots.

St. Louis

Oct. 25.—The non-ferrous markets continued to sag during the week, with the close on lead in car lots at 6.62½c.; spelter, 7c. In less than car lots the quotations to-day were: Lead, 7.25c.; spelter, 7.50c.; tin, 40c.; copper, 18.50c.; antimony, 7.50c. In the Joplin district ores continued to show the effect of the drop in metal prices, with the result that only a very limited tonnage was bought and producers evidenced a disinclination to bring any great amount of ore to the surface. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 6c.; heavy yellow brass, 8c.; light copper, 10c.; heavy red brass, 11c.; heavy copper and copper wire, 11.50c.; zinc, 4c.; lead, 5 50c.; pewter, 24c.; tinfoil, 30c.; tea lead, 3c.; aluminum, 15c.

Greene-Wolf Co., Inc., Expanding

The Greene-Wolf Co., Inc., with general offices at 30 Church Street, New York, has increased its authorized capital from \$20,000 to \$100,000. The officers of the corporation remain the same—D. Greene, president, M. J. Baumgarten, vice-president, and G. William Wolf, secretary and treasurer. The company is now planning a new modern warehouse. Tubular goods are its specialty and it is at present carrying stocks of iron and steel pipe, boiler tubes, seamless and mechanical tubing, bedstead tubes and light gages of butted and welded tubing. With the opening of the new warehouse it will carry a complete stock of other iron and steel products.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight Rates

Freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb., are as follows:

Philadelphia\$0.35	St. Paul 0.695
New York 0.38	Omaha 0.815
Boston 0.415	Omaha (pipe) 0.78
Buffalo 0.295	Denver (wire products) 1.415
Cleveland 0.24	Pacific Coast 1.665
Cincinnati 0.33	Pacific Coast, ship
Indianapolis 0.345	plates 1.335
Chicago 0.38	Birmingham 0.765
St. Louis 0.475 Kansas City 0.815	Jacksonville, all rail. 0.555 Jacksonville, rail and
Kansas City (pipe) 0.78	water 0.46
	New Orleans 0.515

I New Orleans 0.510
The minimum carload to most of the foregoing points is boot lb. To Denver the minimum loading is 40,000 lb., all to the Pacific Coast on all iron and steel products, cept structural material, the minimum is 80,000 lb. On latter item the rate applies to a minimum of 50,000 lb., d there is an extra charge of 9c. per 100 lb. on carloads of minimum of 40,000 lb. On shipments of wrought iron and el pipe to Kansas City, St. Paul, Omaha and Denver, the minimum carload is 46,000 lb. On iron and steel items not tool above the rates vary somewhat and are given in detail the regular railroad tariffs. ted above the rates vary sor the regular railroad tariffs.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in., angles, 3 to 6 in., on one or both legs, 14 in. thick and over, and zees, structural sizes, 2.45c, to 3.10c.

Wire Products

Wire Products

Wire nails, \$3.25 to \$4.50 base per keg; galvanized, 1 in. all longer, including large-head barbed roofing nails, taking palvance over this price of \$1.50 to \$2 and shorter than 1 a \$2 to \$2.50. Bright basic wire, \$3.25 to \$4 per 100 lb.; mealed fence wire. Nos. 6 to 9, \$3.25 as quoted by the merican Steel & Wire Co., and No. 8 and heavier, \$4 to £5, the range of independent makers; galvanized wire, \$5.20; painted barbed wire and fence staples, 10 to \$5.20; painted barbed wire, \$3.40 to \$4.60; polished mee staples, \$3.40 to \$4.60; polished mee staples, \$3.40 to \$4.60; polished mee staples, \$3.40 to \$4.60; polished for staples, \$3.40 to \$4.60; polished mee staples, \$3.40 to \$4.50; gement-coated nails, per count g, \$2.85 to \$4.10; these prices being subject to the usual frames for the smaller trade, all f.o.b. Pittsburgh, freight bidd to point of delivery, terms 60 days, net, less 2 per of off for cash in 10 days. Discounts on woven-wire using are 55 to 58 per cent off list for carload lots, 54 to per cent for 1000-rod lots, and 53 to 56 per cent for small is, f.o.b. Pittsburgh.

Bolts, Nuts and Rivets

Belts, Nuts and Rivets

Curriare bolts, %-in. x 6-in.:
Smaller and shorter, rolled threads
30 and 10 to 20 per cent off list
Cut threads
30 and 10 to 20 per cent off list
Cut threads
30 and 10 to 20 per cent off list
Longer and larger sizes
25 to 20 per cent off list
Longer and larger sizes
25 to 20 per cent off list
Longer and larger sizes
25 to 20 per cent off list
Longer and larger sizes
45 to 40 per cent off list
Cut threads
20 per cent off list
Cut threads
35 per cent off list
Cut the style heads
36 to 10 per cent off list
Cut the style heads
37 per cent off list
Cut threads
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Cut threads
39 to 10 per cent off list
Cut threads
30 to 10 per cent off list
Longer and larger sizes
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Wire Rods

No. 5 common basic or Bessemer rods to domestic considers, \$57 to \$75; chain rods, \$57 to \$75; serew stock rods, \$62 to \$86; rivet and bolt rods and other rods of that character, \$57 to \$75; high carbon rods, \$80 to \$100, depending the carbons.

Railroad Spikes and Track Bolts

Railroad spikes, 9/16-in. and larger, \$4 to \$4.25 per 100 in lots of 200 kegs of 200 lb. each or more; spikes, ½-in. and 7/16-in., \$4.40 to \$5: 5/16-in., \$5 to \$5.75: track lotts, \$7. Boat and barge spikes, \$4.40 to \$5 per 100 lb. a carload lots of 200 kegs or more, f.o.b. Pittsburgh. Tie plates, \$3 to \$4 per 100 lb.

Terne Plates

Prices of terne plates are as follows: 8-lb. coating, 200 lb., \$13.80 per package; 8-lb. coating, I. C., \$14.10; 12-lb. coating, I. C., \$15.80; 15-lb. coating, I. C., \$16.80; 20-lb. coating, I. C., \$18.05; 25-lb. coating, I. C., \$19.30; 30-lb. coating.

I. C., \$20.30; 35-lb. coating, I. C., \$21.30; 40-lb. coating.
I. C., \$22.30 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars at 2.35c. to 3.50c. from mill. Common bar iron, 4.75c.

Wrought Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card: Steel Butt Weld

-			1		
Inches.	Black	Galv.	Inches	Black	Galv.
34, 14 and 34			36	1514 to 2514	+135 to 1135
3		3612 to 40	23		112 to 1112
% to 3	54 to 5719	411/2 to 44	34 to 132	24) 2 to 34) 2	8 to 1832
		Lap	Weld		
2		3412 to 38		2012 to 2812	
212 to 6		37 2 to 41		2212 to 3012	
7 to 12	371/2 to 41	3312 to 37	7 60 12	19)2 to 2732	612 to 1412
15	35 to 3814				
	Butt We	ld, extra	strong, plan	in ends	
1/4, 1/4 and 3/8	43 .0 4612	2512 to 29	1 14	+17 +	-50
29		351 5 to 39		1315 to 2315	612 to +314
% to 11/2		3312 to 43		181 to 2812	515 to 1516
2 to 3	-	4012 to 44	% to 1)2		952 to 1952
	-	ld, extra			
2	45 to 4814		1 2		Sla to 1614
219 to 4	48 to 5012	361 2 to 40	212104		1115 0 1955
412 to 6		291 2 to 33	7 to 8		212 to 1012
9 to 12		241 2 to 28	9 to 12		532 to +232
			1	Transfer Street	

To the large jobbing trade an additional 5 per cent is allowed over the above discounts, which are subject to the usual variations in weight of 5 per cent.

On but and lap weld sizes of black from pipe, discounts for less than carload lots to jobbers have been seven (7) points lower (higher price) than carload lots and on butt and lap weld galvanized from pipes have been nine (9) points lower (higher price).

Reiler Tubes

Boiler Tubes

The following are the prices for carload lots f.o.b. Pitts-burgh:

Lap Welded Steel	Charcoal Iron
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$

Standard Commercial Seamless-Cold Drawn or Hot Rolled Per Net Ton Per Net Ton

1 in.	 				0 1	 					 . 5	327	ı	1	34	ir	1.				 k	è						. 3	207
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These prices do not apply to special specifications for locomotive tubes nor to special specifications for tubes for the Navy Department which will be subject to special negotiations.

Sheets

Prices of the Steel Corporation for mill shipments on sheets of United States standard gage in carloads and larger lots for indefinite delivery are given in the left-hand column. For reasonably prompt delivery, mills are getting up to the prices quoted in the right-hand column:

Bive America	
No. 8 and heavier	Cents per lb. 3.45 to 5.45 3.55 to 5.50 3.60 to 5.55 3.65 to 5.60 3.75 to 5.70 lled
Nos. 17 and 21 Nos. 22 to 24 Nos. 25 and 26 No. 27 No. 28 (base) No. 29 No. 29	4.15 to 6.80 4.20 to 6.85 4.25 to 6.90 4.30 to 6.95 4.35 to 7.00 4.45 to 7.10 4.55 to 7.20
Galvanized Black Sheet Gage	
Nos. 10 and 11 Nos. 12 to 14 Nos. 15 and 16 Nos. 17 to 21 Nos. 22 to 24 Nos. 25 and 26 No. 27 No. 28 (base) No. 29 No. 30 Tin-Mill Black Plate	4.70 to 7.50 4.80 to 7.60 4.95 to 7.75 5.10 to 7.90 5.25 to 8.05 5.40 to 8.20 5.55 to 8.35 5.70 to 8.50 5.95 to 8.75 6.20 to 9.00
Nos. 15 and 16	4.15 to 7.05 4.29 to 7.10 4.25 to 7.15 4.30 to 7.25 4.35 to 7.25 4.40 to 7.30 4.40 to 7.30 4.45 to 7.35

BETTER CAR SUPPLY

Decided Improvement In Transportation—Lake Region Getting Coal Freely.

PITTSBURGH, Oct. 26.—Recent developments in connection with the distribution of open top cars for coal shipments have been of a decidedly favorable character and indications now are that long before the lake navigation season closes officially, a much better supply of this kind of equipment will become available for the shipment of steel and general freight which ordinarily move in such cars.

A recent order of the Interstate Commerce Commission has relieved the Bessemer & Lake Erie Railroad and some divisions of the Pennsylvania Railroad from spotting cars for lake shipments of coal. While the released cars cannot become available for steel shipments until the orders, which went into effect on Oct. 15, are rescinded, expectations of relief are strong because officials of the Car Service Division of the American Railway Association have expressed the opinion that the lake demands will have been satisfied in the next ten days or two weeks and that when this occurs Orders Nos. 10 and 20 of the Interstate Commerce Commission will be lifted. Order No. 20, which replaced in the Oct. 15 order the old orders, Nos. 7 and 9, has to do with what constitutes a coal car, which is described as one with sides of 38 in. and higher. Maintenance of this limitation has worked a serious hardship upon those steel manufacturers who ship most of their product in open top cars but they will benefit most by the repeal of the order.

That the lake region is getting ample supplies of coal is evident not only from the order relieving the roads mentioned from further placements of cars for lake shipments, but also by the fact there has been a sharp decline in the price of lake coal. The market for such shipments now is quotable at \$5 to \$5.25 at mines for run of mine grade and at \$5.50 at mines for prepared sizes; these prices compare with \$7 to \$7.50, at mines, only about two weeks ago. Failure of the boats to load all the coal reaching the lake ports is said to have caused a serious congestion and the consequent weakening in prices. With the decline in the lake demand and the fact that export shipments are restricted on account of embargoes and the difficulty in securing permits, the general coal market is easier and now is quotable within a range of \$8 to \$8.50 for spot tonnages.

Malleable Castings Situation

Reports gathered by the American Malleable Castings Association from its members show that shipments of malleable castings during September amounted to 79 per cent of the capacity of their plants, and the October shipments are not expected to show much change from that percentage. These monthly shipments indicate the approximate operations of the plants. Some of the foundries that specialize in automotive work have taken on railroad and other lines of work, and these are apparently operating at an average of about 65 per cent of capacity. There is a good demand from the railroads for malleable castings for repair work, and some good-sized orders have recently been placed by the railroads and agricultural implement Malleable foundries that specialize on chain and bedstead castings are very busy. Eastern malleable foundries apparently have not been affected as much as those in the Central West by the slump in business, as some Eastern plants are still crowded with work. Practically all the malleable foundries are reported to have enough orders on their books to keep them running at present capacity to Jan. 1.

In preparing their monthly production chart, the association has fixed as its 100 per cent production basis the estimated annual production with the utilization of all the molding floor space and with normal efficiency on the part of the molders. Consequently, a 100 per cent production can hardly be expected at any time, as that means an adequate supply of molders at all the plants. The nearest the malleable foundries

came to getting up to maximum capacity was in October, 1917, when their shipments were 97 per cent of the maximum. The best month this year was in May, when shipments were 86 per cent of maximum capacity, and the poorest was in February, when they dropped to 66 per cent of capacity. The 79 per cent shipment in September was a gain of 1 per cent over August.

Democracy in Engineering Profession

Morris L. Cooke, consulting engineer, Philadelphia, at the weekly noonday meeting of the Philadelphia Engineers' Club, Oct. 19, pleaded for the development of a spirit of democracy in engineering societies and the engineering profession generally. "We engineers," the speaker declared, "must avoid building up a cult and looking upon ourselves as a class apart. Let us study the technique of reaching the people through non-technical publications and throw open our laboratories, libraries and halls to the widest possible use. Let us seek to have engineering grow up, as it were, out of the necessities and desires and life of the people.

"Nothing promotes genuine democracy so effectively," Mr. Cooke asserted, "as publicity." The speaker then went on to laud the constitution of the recently proposed Federated American Engineering Societies which says in part: "This organization shall stand for the principle of publicity and open meetings." Too many engineers, the speaker remarked, consider too much of what they think they ought to get out of a society and not what they ought to give to the society. An engineering society, he added, can, if the members so choose, be made an excellent medium for rendering service to the profession.

Exports Increase, Imports Decrease in September

Washington, Oct. 26.—Exports increased somewhat during September while imports fell off, according to the preliminary figures of the Bureau of Foreign and Domestic Commerce. Exports for the month totaled \$606,000,000 as compared with \$578,000,000 in August of this year, and \$595,000,000 in September, 1919. This figure was considerably below that of other months during the past year, the total in March, 1920, having been \$819,556,037. The record month since the signing of the armistice was in June, 1919, when exports totaled \$928,379,203.

For the nine months' period ended with September, 1920, exports amounted to \$6,082,000,000, as compared with \$5,867,000,000 for the corresponding period of a year ago.

Imports in September totaled \$363,000,000, which was \$150,000,000 less than in August, when the total was \$513,000,000. Imports in June, 1920, set a high mark which has not since been equalled, the total in that month being \$552,605,534. For the nine months ended with September, this year, imports totaled \$4,358,000,000, as against \$2,697,000,000 during the corresponding period of last year.

Low Prices on Steel Bars

SEATTLE, WASH., Oct. 26.—The Pacific Coast Steel Co., Seattle, has reduced prices on soft steel bars to 4.25c., Seattle, equal to 2.50c., Pittsburgh. Effective Thursday, Oct. 21, the A. M. Castle Co., Chicago, made a flat reduction of \$10 per ton on bars, shapes and plates to meet local warehouse competition.

The Great Northern is in the market for 500 refrigerator cars and the Western Pacific for 1000 steel gondolas.

The Pacific Car & Foundry Co., Seattle, has reduced the price of its standard logging car from \$1,825 to \$1,725.

Date Changed for Machine Tool Convention

The National Machine Tool Builders Association will hold its annual fall meeting at Hotel Astor, New York, on Thursday and Friday, Nov. 11 and 12, instead of on Dec. 2 and 3, as had previously been planned.

THREE-SHIFT PLAN

Advantageous Results in Various Industries Recited at Philadelphia Meeting

The advantages of the three-shift as against the two-shift day were discussed from many angles in a symposium held under the auspices of the Engineers Club of Philadelphia, at the club's regular monthly meeting, Oct. 19. Robert B. Wolf, consulting engineer, New York, was the principal speaker, and besides specifically referring to experiences of his with the three-shift plan in the wood pulp industry recited conclusions that he had made as a result of an extensive study of the subject that might be applied to industries in general.

Among the many men who discussed the subject was Harrington Emerson, who told of his experiences in changing from a two-shift to a three-shift day in a steel mill in which production was increased 37 per cent and cost reduced 15 per cent in spite of an increase in wages of 15 per cent.

Mr. Wolf told how in seven years' time the production in one pulp mill where the three-shift plan was installed was increased from 42,000 to 111,000 tons per year without adding a single digester for cooking the pulp; in other words the production was increased 2.9 times. Furthermore, Mr. Wolf asserted, the quality changed during this period from the poorest pulp manufactured to the very best. The men were able to accomplish these unusual results because they were not continually tired as usually pertains with the two-shift day, but were mentally alert.

Mr. Wolf showed charts that illustrated three methods of rotating shifts; one of these is for places where there is no Sunday work, another shows a way of changing the rotation in a seven-day continuous process department, such as in the boiler house, and a third method, which provides means for an alternate way of changing shifts. With the latter method men are on different shifts each week. This is customary in the paper industry, Mr. Wolf pointed out. In continuous process operations it is well, he added, to allow the men one day off in seven.

Answering Objections to the Change

In a recital of difficulties and objections encountered before installing the three-shift day, Mr. Wolf said the idea that men would not want the three shifts but preferred the long hours, was frequently voiced. The results, however, he stated, proved that the men almost invariably welcomed the change to three shifts. There were a few men, he said, such as foremen, who prophesied difficulties, and there was occasionally some old man who had worked two shifts all of his life and gotten so in the habit of it that he preferred not to change; but the change was enthusiastically welcomed by at least 99 per cent of the men, Mr. Wolf declared, and the remaining I per cent were quickly convinced.

"I have known, for instance," Mr. Wolf went on to say, "where the management has compromised with the

men to such an extent that they were getting practically three shift rates and still working two shifts, where the workmen objected to the cut in wages which must come. However, it seems to me inexcusable that the management should operate its plant in such a short-sighted way, that is, paying three shift rates without getting the benefits that come from the shorter hours, which keep their men mentally and physically alert at all times."

"We argued ourselves into believing that the men would not know what to do with their time when off duty," the speaker further stated. "We soon found, however, that by assisting in the creation of outside recreation facilities this was not a problem at all; in fact, it became a big asset to us in developing esprit-de-corps in the community as well as in the plant. I do not mean that we adopted what is familiarly known as welfare work. I do not believe in this because of its paternalistic nature. However, when the men are encouraged to make their wants known and the company recognizes its responsibilities to the community as well as to its employees, it will not be long before the men will be actually creating the necessary means of recreation."

On Increased Labor and Labor Cost

Before the situation was carefully analyzed, said Mr. Wolf, it was thought that it would add 50 per cent to labor costs. As a matter of fact the cost per ton of product invariably decreased. The problem of possible shortage in labor was one which was also considered serious, the speaker remarked, but it was easily overcome by distributing key men throughout the plant and, while there was a slight amount of confusion to start with, this was soon over.

Lack of housing facilities was another objection which seemed, at first sight, to be a very serious one, especially in one particular instance where the plant was located in a small community. This, however, did not prove to be serious, as the actual percentage increase in the number of men was really small and the temporary congestion was quickly relieved.

In this connection, it should always be borne in mind, said Mr. Wolf, that the change from two shifts to three shifts never means an increase of 50 per cent in labor, but always a very much smaller percentage, owing to the fact that the number of men in each operation can be reduced because of the shorter hours and also from the fact that in all industries a large percentage of the men are on day work.

Besides Harrington Emerson the following took part in the discussion: Arthur B. Jones, vice-president, Clark, MacMullen & Riley, consulting engineers, New York; Carleton E. Davis, chief of bureau of water, Philadelphia; Prof. A. G. Christie, Johns Hopkins University, Baltimore; Dr. H. E. Kiefer, dairyman; Morris L. Cooke, consulting engineer, Philadelphia, and Henry W. Shelton. These men recited experiences with and advantages of the three-shift plan in cement, chemical, mining, dairy and coal industries and municipal water plants.

Increased Production of Coal and Coke

Washington, Oct. 26.—With a single exception production of bituminous coal during the week ended Oct. 16 was greater than in any week since the signing of the armistice. The output of beehive coke continued to fluctuate a little above the 400,000-ton mark during the week. The production of anthracite was greater than in any week since last July. The week's figures thus show that conditions are steadily improving.

Production of bituminous coal totaled 12,135,000 tons, an increase of 44,000 tons over the preceding week. This total has been surpassed but twice during the time over which records of weekly output extend, not counting the period of greatest war activity. These two weeks were in early December, 1917, when a production of 12,143,000 tons was obtained, and the last

week before the coal strike of 1919, when a total of 13,140,000 tons was reached. The average production per working day was 2,022,000 tons. This has been surpassed only by the daily rate in the five-day week of Jan. 3, 1920, and in the pre-strike week of Oct. 23, 1919.

Production for the year 1920 up to date is now only about 10,000,000 tons behind 1917, and about 44,500,000 tons behind 1918, but is nearly 52,000,000 tons ahead of 1919.

The total production of beehive coke during the week ended Sept. 16 was 403,000 tons, an increase of 3000 tons over the revised figure of production for the preceding week. Cumulative production since the beginning of the year now stands at 16,874,000 tons, an increase over 1919 of 1,389,000 tons, or approximately 9 per cent.

PERSONAL

George F. Downs, president Lackawanna Steel Co., Buffalo, has been elected a director of the American Iron and Steel Institute to fill the vacancy caused by the death of Chas. H. McCullough, Jr.

W. A. Ruth, who recently resigned from the sales force of the National Car Coupler Co., has joined the organization of the Superior Steel Castings Co., with works and main office at Benton Harbor, Mich. His experience in the steel foundry industry covers more than 25 years. He has served in the various capacities of chemist, superintendent open hearth department, works manager, and sales manager. He will help to install special heat treating and finishing processes in both the steel foundry and malleable iron unit. Mr. Ruth's headquarters will be, No. 1550 McCormick Building, Chicago.

D. J. Crowley, has been appointed by the Tacony Steel Company, Philadelphia, Michigan sales agent with offices in the Dime Bank Building, Detroit, Mich.

Charles Davis has been appointed superintendent and Guy Ohl assistant superintendent of the sheet mill department of the Youngstown Sheet & Tube Co., Youngstown, Ohio. Mr. Davis had been assistant and succeeds J. J. Beck, resigned.

Robert W. Early, for the past 12 years connected with the claim department of the American Sheet & Tin Plate Co., is in charge as resident manager of a new branch office which has been opened at 628 Jenkins Building, Pittsburgh, by Fairbank & Co., Cleveland.

Roy Davey, who, at the request of the receiver, returned to his old post as general sales manager of the Bethlehem Motors Corporation, has announced his withdrawal from that organization.

Clarence C. Brinley has been retained as Eastern manager of the trolley carrier department of the Conveyors Corporation of America, Chicago, and will be attached to the New York office, 110 W. 40th Street. Mr. Brinley is an engineer of broad experience in elevating and conveying machinery.

Robert B. Hitchcock has resigned as chief chemist at the coke plant of the Youngstown Sheet & Tube Co., Youngstown, Ohio, to become chief chemist of the Woodward Iron & Steel Co., Woodward, Ala.

Christopher G. Atwater, assistant to the vice-president of the Barrett Co., New York, and manager of the agricultural department, has returned from a trip through the Orient of about 17 months' duration, investigating markets for coke oven by-products.

James Dean, of Wm. A. Read & Co., has been elected a director of the Greenfield Tap & Die Corporation Greenfield, Mass.

W. H. Woodin, president American Car & Foundry Co., has been elected a member of the executive committee of the American Locomotive Co.

S. N. Peterson, purchasing agent S. K. F. Ball Bearing Co., Hartford, Conn., has become purchasing supervisor of the S. K. F. Industries, Inc., with headquarters in New York.

C. L. Goodrich, Pratt & Whitney Co., Hartford. Conn., has started on a three weeks' trip to various manufacturing centers, with three members of the Chilean Commission, Major Figueroa, Captain Bianchi and Senor Fernando Hille. They expect to visit Syracuse, Buffalo, Cleveland, Cincinnati, Hamilton, Detroit and possibly Chicago.

Frank C. Davies, foreman at the coke plant of the Youngstown Sheet & Tube Co., Youngstown, Ohio, has accepted the position of assistant superintendent of blast furnaces of the Donner Steel Co., Buffalo, N. Y.

A. J. Weaver, for nine and one-half years, assistant superintendent, Billings & Spencer Co., Hartford, Conn., has returned to the Pratt & Whitney Co., Hartford, as assistant chief inspector. He started

with the company in 1888, and became assistant forgman and mechanical engineer before he left.

Dan Gilkey, Pacific Coast representative, the Acason Motor Truck Co., Detroit, has been promoted to vice-president in charge of sales and advertising.

F. M. Jamieson, purchasing agent, the Wire Wheel Corporation of America, of Buffalo, has been promoted to the position of manager of the Detroit branch. C. Newton Graves, formerly of the Leach-Biltwell Motor Co., Los Angeles, is now factory representative for the company in the Michigan territory.

E. W. Bernhard has been placed in charge of manufacturing in the plants of the L. H. Gilmer Co., manufacturer of solid woven belting and automotive products, whose home offices are in Tacony, Philadelphia. Mr. Bernhard, for the past seven years, has been with the S. K. F. Industries, Inc., and prior to his joining the Gilmer organization was assistant general factory manager of the organizations under S. K. F. control. He will have charge of the two Gilmer plants in Philadelphia, the plant in North Wales, Pa., and the mill at Millen, Ga.

G. Schirmer has resigned his position as sales engineer with the Whiting Foundry Equipment Co. and is now associated with W. C. Bennett, industrial engineer, at 189 West Madison Street, Chicago, engaging in all branches of foundry and industrial engineering, designing, superintending and equipping of complete installations.

J. H. Gilhuly, district representative of the Youngstown Sheet & Tube Co., Youngstown, Ohio, at San Francisco, after making a trip through Europe, has resumed his duties.

Konrad Schreier, Sheboygan, Wis., has resigned as secretary-treasurer Falls Motors Corporation, Sheboygan Falls, Wis., to devote his undivided time to extensive interests in Chicago.

John P. Kelley has been promoted to general sales manager A. O. Smith Corporation, Milwaukee, with which concern he has been associated 23 years. He succeeds James L. Sinyard, a director and secretary of the corporation.

Chevalier E. d'Amico, formerly with the Italian military mission to the United States, now general agent in Italy for F. R. Phillips & Sons Co., Philludelphia, and the Perry, Buxton, Doane Co., Boston, sails on Nov. 16 from Genoa on a business trip to this country.

Leslie Bradford, superintendent of the open-hearth department of the Broken Hill Proprietary Co., Newcastle, Australia, is in the country seeking equipment for an electric furnace plant he is to establish at Sydney, Australia, for the manufacture of steel castings and alloy steels. His investigations have taken him through Continental Europe and Great Britain.

G. E. Anderson, formerly assistant Eastern sales manager of the Duff Mfg. Co., Pittsburgh, has been promoted to Southwestern sales manager, and placed in charge of its new branch office located in the Railway Exchange Building, St. Louis.

Fred E. Kelly, formerly with M. Yaeger, Cleveland, dealer in tools, has become connected with the Cowles Tool Co., West 110th Street, Cleveland, manufacturer of high-speed milling cutters.

Stephen J. Carroll, vice-president Pennsylvania Steel Export Co., Philadelphia, will sail Oct. 30 for Buenos Ayres, Argentina. where he will remain two years as sales representative of his company. Some of his friends in the steel trade gave a dinner in his honor at the Art Club, Philadelphia, last Saturday evening.

The Pulaski Iron Co, which last week announced the appointment as manager of sales of Richard Peters. Jr., formerly with Rogers, Brown & Co. and Robert C. Lea & Co., Philadelphia, will hereafter sell its foundry pig iron direct to consumers instead of through brokers, as has been done in the past. The company will soon expand its sales department to cover the territory formerly handled by agents.

OBITUARY

PERCY B. TAYLOR, Newark, N. J., a prominent consulting engineer of that city, died Oct. 21, at his residence, 57 South Eleventh Street, after many months illness due to heart trouble. Mr. Taylor was born at Manchester, England, May 26, 1865, and came to this country in 1873. His early business experience was gained at the plant of Cyrus Currier & Sons, machinists and founders, Newark, and for many years he was associated with this organization, becoming head of the designing department. He later organized the Taylor-Martin Co., and with plant on New Jersey Railroad Avenue, this company engaged in the design and manufacture of special machinery and tools. In 1897, Mr. Taylor dissolved this company to operate individually as a consulting engineer. In this line he undertook both plant construction, machinery installation and design of special machinery, among his clients being Cawley, Clark & Co., manufacturers of chemical products and for which firm many special machine processes were developed; Bless & Drake, manufacturers of sad irons, etc.; United Color & Pigment Co., and American Oil & Supply Co., all of Newark. Mr. Taylor designed and patented a successful internal combustion engine, automobile transmission and other mechanical mechan-He was a member of the American Society of Mechanical Engineers. Mr. Taylor is survived by his wife, one daughter, Marjorie D., and one son, Kenneth The latter, with Robert Bolton, associated H. Taylor. with Mr. Taylor for the past fourteen years, will continue the business founded by Mr. Taylor at the present address, Essex Building.

GEORGE B. LIMBERT, founder and president George B. Limbert & Co., Chicago, and East Chicago, Ind., manufacturer of iron pipe, fittings, etc., died on Oct. 17. Mr. Limbert was born at Ripon, Wis., in 1862, and organized the company bearing his name in 1897. He was a member of the executive committee of the National Iron Pipe & Supply Association.

ALVIN A. WINSHIP, superintendent of machinery at the Bethlehem Shipbuilding Corporation plant, Sparrows Point, Md., died Oct. 17, aged 48 years. His death was due to a tumor of the brain.

Butler Day Celebrated

In connection with the observance Oct. 23 of "Butler Day" by the City of Niles, Ohio, in honor of Joseph G. Butler, Jr., a bronze bust of the veteran iron and steel manufacturer of the Mahoning Valley was unveiled in the McKinley Memorial Building. The celebration was planned to attest the appreciation of the community for Mr. Butler's efforts in its behalf, his most notable achievement being the McKinley Memorial. The bust was designed by J. Massey Rhind, New York sculptor. Following a parade in which 3,000 participated, the replica was unveiled. Mr. Butler was presented a silver loving cup one foot high by the school schildren of Niles, which bears this inscription: "To Joseph G. Butler, Jr., from Niles school children, Butler Day, Oct. 23, 1920." Though Mr. Butler is still suffering from injuries he sustained last winter when he was struck by an automobile on his way home from the funeral of H. C. Frick at Pittsburgh, he attended and expressed his thanks for the demonstration and gift. Mr. Butler will be 80 years of age on Dec. 21.

Jonathan Warner, president of the Trumbull Steel Co., Warren, Ohio, has presented the Butler Art Institute of Youngstown, a portrait painting of Mr. Butler by Ivan G. Olinsky, New York painter. Mr. Warner is a trustee of the institute, which was built and donated to the people of the Mahoning Valley by Mr. Butler.

The Midland Iron & Steel Co., Midland, Ont., resumed operations at its plant there on Wednesday last, after a shutdown of several months.

Mechanical Engineers Visit Fore River Shipyard

An inspection was made of the Fore River plant, Bethlehem Shipbuilding Corporation, Quincy, Mass., Oct. 19 by the Boston section, American Society of Mechanical Engineers. At 6 o'clock a dinner was served to the members of the section and their guests in the administration building of the corporation. There was an attendance of 150. Following the dinner were speeches by Captain H. C. Dinger, Bethlehem Shipbuilding Corporation, on "Marine Reduction Gears," and by Harry E. B. Gould, general superintendent of the corporation on "Ship Construction."

The engineers assembled at the plant at 2 o'clock and were divided into groups, one composed of those interested in cost and production control; another, in machine shops; a third, in the electrical features; another, in the power house; the fifth, in the plant in general. All groups were conducted all over the plant, but devoted more time to that feature in which they were particularly interested.

In his speech Mr. Gould emphasized that the engineering problem of to-day at his plant is the "engineering of men." "The nation needs to know to-day as much about 'mentalurgy' as it does about metallurgy," he said. "We need more man-handling devices than material handling devices." Because of the inefficiency of labor, it costs from \$190 to \$210 a ton to build a ship in the Fore River plant, where it cost \$145 during the war. There are now 9000 men employed in this yard; there were 23,000 employed at the height of war work; the normal capacity for the plant to-day is 12,000 men. Mr. Gould emphasized the troubles he was having in handling labor. At the same time the plant has never had a strike. "We have to listen continually to the demands of labor; we have to argue; we have to be a good loser; yet we have got to imagine we are on top of the heap," he said. The speaker dwelt upon the importance of developing our foreign trade and cautioned Americans against over-confidence in their own abilities and resources.

Captain Dinger said that the purpose of a marine reduction gear was to reduce the speed of revolution from the engine to the propeller shaft, as instanced by the reduction of speed of the turbine engine, moving at 3000 r.p.m. to 100 r.p.m. for the shaft through such a gear. He said that there were two basic principles governing the construction of marine reduction gear sets: Either they must be absolutely rigid in structure and gear support, with the gears cut as nearly accurate as humanly possible, or they must have some degree of flexibility to allow for inaccuracy of cutting or set up. In his experience there had been much less trouble with the rigid type than with the flexible.

The largest marine reduction gear is on a 20,000-hp. British cruiser. Eighty per cent of reduction gears go wrong because of faulty lubrication, the speaker maintained. A common trouble is the mixing of salt water with the oil, which destroys the oil film and causes metal to wear on metal. The De Laval Separator Co. has put out a separator for removing the salt water from the oil. The pressure system is better than the gravity system for oiling reduction gear bearings.

In order to obtain adequate supplies of silicate brick for the maintenance of its blast furnaces, the Dominion Iron & Steel Co., Sydney, N. S, is taking steps to develop a large tract of land rich in silica, which the company acquired at Neils Mountain, near North Bay, Ont. A silica brick plant is now being erected at Sydney, N. S., and is expected to be completed and in operation in the near future.

One of the six blast furnaces in the Haselton group of the Republic Iron & Steel Co., Youngstown, Ohio, No. 1, has been suspended for relining. Because of backward business conditions, one of the three furnaces of the Brier Hill Steel Co. at the Brier Hill works, Youngstown, is idle, and is being repaired.

DECREASED BUYING

Cancellations in Youngstown District—Low Prices on Pig Iron—Sheets Less Active

Youngstown, Ohio, Oct. 26 .- Decline in steel buying is now more pronounced with Valley interests than at any time in the past five years, although there is considerable divergence between conditions prevailing among the independents. There has been considerable cancellation and suspension of black sheet and light bar commitments with important Valley makers lately. As a consequence, lower prices and earlier deliveries are offered on sheets. While bar prices are little, if any, weakened, substantially earlier deliveries are possible. While producers are feeling the effects of the readjustment in steel markets, there is nevertheless a substantial though reduced volume of current forward business and generally large unfilled tonnage with the more established interests. Owing to unsettled fuel prices, the pig iron market is temporarily at a standstill. product coal has declined roughly \$2 a ton to a level around \$8 and steam coal \$2.50 from quotations recently obtaining to \$7.50, both f.o.b. mine. In well informed quarters it is regarded as assured that fuel prices are permanently moving down to more normal levels. Close observers anticipate that a period of reduced buying and price declines confront the industry. A lower market, though, is expected to stimulate a broad demand for iron and steel products, which has been dormant because of relatively high prices. As seen by a district executive, a winter of somewhat less active operations will be followed by a firm revival in buying.

Sheet Plant Operations

Because of accumulated production and slowing business, some up-Valley sheet plants are operating at a reduced rate. Departments of some of the lower-Valley plants are on a reduced scale of operations, while others still in operation have unfilled tonnage not to exceed several weeks' capacity operating requirement, with the inflow of new business restricted.

While the old metals market reflects the general trend, one Valley dealer has started deliveries on a contract approximately 20,000 tons of heavy melting signed several weeks ago at \$26. New business in plate ends has shown a temporary slack. In face of a declining scrap market, some district dealers stand to lose on contracts.

The basic pig iron market has evidently settled at

\$40, Valley furnace, by reason of two reported transactions recently negotiated, one involving 5000 tons and the other 1500. Some buying interests, though anticipate further recessions. It is the belief that the nominal quotation of \$47, Valley, on bessemer iron can be substantially shaded.

Galvanized Sold at 8.50c.

Buying in the sheet market has been uniformly light and confined to small tonnages. Black sheets are still quotable at 6.50c. to 7c. base, blue annealed around 5c. and galvanized from 7.75c to 8.50c. Light gages of blue annealed are quotable from 5.50c. to 6c., with very early delivery possible. One company reports selling a round tonnage of galvanized at 8.50c.

While sheet bars are apparently stationary for the time being at \$65, lower prices have been quoted and buyers express the opinion that they could buy at \$60. Movement of such semi-finished material has been more or less restricted by inadequate car supply. Some sheet makers who are self-contained in this raw material are also inclined to offer tonnages of sheet bars. Steel billets and slabs are still being quoted at \$60.

Revived demand from agricultural implement makers constitutes a bright feature in the bar market. Plate demand continues sporadic and weak. Pipe makers are engaging their plate mill capacity largely in making skelp for the tube mills. Plate producers without pipe mills report a fair amount of buying for car and locomotive building. One important plate interest reports that its unfilled tonnage is sufficient for only about two weeks' production. The market remains at 3.25c., with makers evidently unwilling to make material price concessions to stimulate business.

While inquiry for strip steel of both grades is light, the leading maker is operating both hot and cold rolled departments at a good average. There is sustained business in tin plate, lapweld and buttweld pipe, wire nails and plain wire.

Some improvement has been made in shipments of sheets because of a more plentiful supply of box cars. One interest is compelled to allocate its wire nails and plain wire output, owing to sold-up condition in this department.

Contrary to the general situation with respect to the sheet market is the assertion of an independent that it could easily sell for 1920 delivery twice the tonnage it can produce and that its customers are insistent upon securing output. On the other hand, prompt tonnage may be secured from other makers.

ENGINEERS TO MEET

Program of Fall Convention in Pittsburgh of Society of Industrial Engineers

Industrial education will be the keynote subject of the national fall convention of the Society of Industrial Engineers to be held at the Carnegie Music Hall, Pittsburgh, Nov. 10, 11 and 12. Meetings are scheduled chiefly for the afternoons, leaving the mornings for plant visitations and the inspection of an exhibition at meeting headquarters of labor-saving factory equipment, office appliances and the like. A feature of the meeting will be a series of group luncheons and dinners. For example, on Wednesday evening dinners will be held for educators, for personnel directors and for production managers; luncheons on Friday for cost accountants and for professional industrial engineers, and a dinner on Friday evening for the fatigue elimination committee.

On Thursday evening will be held a banquet at which the president of the society, L. W. Wallace, director of the Red Cross Institute for the Blind, Baltimore, will preside. The speakers for the banquet are Frank B. Gilbreth, Frank B. Gilbreth, Inc., Montclair, N. J., on "Some New Factors in Industrial Education"; M. O. Leighton, chairman National Public Works Department Association, Washington, on "The Need for the Application of Industrial Engineering Principles in National Affairs"; H. H. Merrick, president Great Lakes Trust

Co., Chicago, on "Training Managers to Apply Business Principles," and Dwight T. Farnham, St. Louis, on "European Industrial Conditions."

The opening session is scheduled for 2.30 p. m., Nov. 10. Among those who will speak are E. L. Ryerson, Jr., vice-president and works manager Joseph T. Ryerson & Son, Chicago, on "Training Industrial Engineers Within the Organization," and William O. Lichtner, Thompson & Lichtner, Boston, on "Methods of Training Time Study Men."

At a session at 8 p. m., Nov. 10, the subjects are "College Training for Industrial Engineers" and "Educational Training for Men in Business," and the speakers include F. V. Larkin, Lehigh University; Joseph W. Roe, Piercê-Arrow Co., Buffalo; Dean Ralph E. Heilman, Northwestern University School of Commerce, and Charles E. Funk, secretary Industrial Extension Institute, New York.

At a session at 3 p. m., Nov. 11, training shop employees is to be discussed by J. J Garvey, Western Electric Co., Hawthorne, Ill., and F. E. Searle, Ford Motor Co., Detroit. Dr. Allen Rogers, Pratt Institute, Brooklyn, is to discuss training foremen.

Brooklyn, is to discuss training foremen. George C. Dent, 327 South LaSalle Street, Chicago, is business manager of the society.

The Norbom Engineering Co., Darby, Pa., has appointed the following as distributors of its valves, reamers and Lysholm tables: J. H. Best, 339 Courtland St., Baltimore, F. A. Mazzur & Co., 141 Milk St., Boston.

Machinery Markets and News of the Works

TRADE CONTINUES DULL

Little Activity in Machine-Tool Markets

Some Sellers, However, Doing a Fair Business in Single Machines

The machine-tool trade in the past week has been without significant developments. Business continues extremely quiet; in some markets, almost at a stand-still. There is no sign of a revival of interest among buyers except in a spotty way, as, for example, two sellers in New York report last week the most active

in many weeks, but their sales were mostly single machines to scattered buyers.

There is not sufficient real business developing to furnish a real test of prices, but machine-tool builders freely assert, in response to inquiries, that they have no present intention of reducing prices, and that, moreover, they cannot do so without loss. Indications are that most of the manufacturers prefer to curtail operations rather than attempt to encourage the placing of orders by offering lower prices.

Prospective railroad business is being held up, in some cases indefinitely.

New York

NEW YORK, Oct. 26.

The machine-tool market continues extremely quiet, though one or two sellers report a decided improvement in business within the past week. One leading New England manufacturer, through its New York office, has thus far in October had its best month of the year, but nearly all sales were single tools. The Reading Steel Casting Co., Reading, Pa., is inquiring for 25 to 30 machines for an addition to its plant, this being the largest domestic inquiry the Eastern trade has received in many weeks.

Some domestic business is being placed and export inquiry continues fairly active. Fowler, Forbes & Co. have asked for bids on a 25-ton steam locomotive crane for China. Perin & Marshall, 2 Rector Street, New York, are in the market for two 10-ton, 45-ft. and 60-ft. span overhead traveling cranes for India.

Among recent sales are: Champion Engineering Co., a 15-ton, 3-motor, 45-ft. span overhead traveling crane to the Columbiana Boiler Co., Columbiana, Ohio; Industrial Works, two 15-ton, 45-ft. boom locomotive cranes to the Standard Oil Co. of New Jersey for Bayway, N. J. and a 20-ton locomotive crane to Perin & Marshall for India; Morgan Engineering Co, a 50-ton, 42-ft. span overhead traveling crane to the Baldwin Locomotive Works, Philadelphia; Shepard Electric Crane & Hoist Co., a 7½-ton, 63-ft. span overhead traveling crane to David H. Smith, Iron and steel, Brooklyn, N. Y., and a 2½-yd. bucket crane, 80-ft. span to the Chemical Construction Co., Raleigh, N. C.; Chisholm-Moore Mfg. Co. two 3-ton, 18-ft. span hand power cranes to the A. S. Cameron Steam Pump Works, Phillipsburg, N. J.

The United Steel Frame Co., 53 Wooster Street, New York, has completed plans and will take bids at once for extensions to its five-story works at 56 Lewis Street, to cost about \$17,000.

The Metals Fabricating Co., Inc., 99 John Street, New York, has filed notice of dissolution under State laws.

The B. F. Gilmour Co., Brooklyn, has been incorporated with a capital of \$50,000 by E. H. H. Smith and B. F. Gilmour, 264 Stratford Road, to manufacture iron and steel products.

The Colonial Mantle & Refrigerator Co., 494 Dumont Avenue, Brooklyn, has completed plans and will soon call for bids for a new one-story plant, 40 x 100 ft., to cost about \$38,000. S. Millman & Son, 1780 Pitkin Avenue, are architects.

The Turn Auto Corporation, 149 Broadway, New York, manufacturer of automobiles and equipment, has increased its capital from \$1,000,000 to \$1,500,000.

The Kloss Machinery Corporation, New York, has been incorporated with a capital of \$50,000 by H. J. Yates, A. Behr and H. Kloss, 51 Chambers Street, to manufacture machinery and parts.

The Hellman Motor Corporation, 568 Jackson Avenue, Long Island City, N. Y., has awarded a contract to George A. Violante, 241 Camelia Street, for its new service building at the Bridge Plaza, one-story, to cost about \$250,000.

The Wickwire-Spencer Steel Co., Buffalo, has acquired property at \$41-3 East 136th Street, extending through to 137th Street, formerly held by the Muglers Iron Works. The site is improved with two buildings, one and two-stories respectively, and will be used by the new owner for a local plant. The company has also purchased an adjoining plot of ground of like size from the Port Morris Land & Improvement Co., for future extensions.

The Northeastern Rubber Co., New York, has been incorporated with a capital of \$250,000 by A. D. Royce, M. Boyle and R. Swinnerton, 31 Nassau Street, to manufacture mechanical and other rubber products.

The Rolls-Royce Co., of America, Inc., 785 Fifth Avenue, New York, has filed notice of incorporation under Delaware laws, with capital of \$7,500,000, to manufacture automobiles. It is now operating a plant at Springfield, Mass.

The Millard F. Smith Co., 62 Gold Street, New York, manufacturer of hydrants, etc., has increased its capital from \$25,000 to \$75,000.

The Board of Trustees, Freeport, L. I., has completed plans for extensions and improvements in the city power plant to cost about \$115,000, including equipment.

The Trojan Machine Co., Troy, N. Y., has filed notice of dissolution under State laws.

The Automotor Corporation, New York, has been incorporated with a capital of \$275,000 by D. F. Sullivan, U. Thompson, Jr., and H. P. Swanton, 45 East Seventeenth Street, to manufacture automobiles and parts.

Ray Gaul, 40 Madison Avenue, Albany, N. Y., is taking bids for a one-story addition to his machine shop, 75 x 75 ft.

The Henba Balloon Developing & Transport Co., Brooklyn, has been incorporated with a capital of \$50,000 by J. Henba, G. Frey and R. Hyde. 9201 Fort Hamilton Avenue, to manufacture airplanes and parts.

Edwards & Co., Exterior Avenue and 140th Street, New York, manufacturers of electrical specialties, have filed notice of capital increase to \$75,000.

The State Hospital Commission, Capitol Building, Albany, N. Y., is having plans prepared for extensions and improvements in the power plant at the local State hospital, to cost about \$125,000. E. S. Elwood is secretary.

The Touissant Automobile Corporation, New York, has been incorporated with a capital of \$100,000 by E. L. Labohne, J. L. Welcome and A. Legare, 545 Lenox Avenue, to manufacture automobile parts and equipment.

The Oswego Falls Pulp & Paper Co., First Street, Fulton N. Y., is having plans prepared for extensions and improvements in its power plant.

The W. & L. Auto Garage Co., New York, has leased a six-story building at 135-37 Division Street, near Canal Street, 51 x 62 ft., which it will remodel for an automobile service and repair works.

The International Western Electric Co., Inc., 195 Broadway, New York, is arranging for the establishment of a ch at Singapore, Malay Peninsula.

John N. Willys, president of the Willys-Overland Co., 521 West Fifty-seventh Street, New York, with plant at Toledo, Ohio, has denied the report that the company will be taken over by the General Motors Corporation. It is stated that no negotiations are under way for the acquisition or the merger of the company.

C. E. Halback & Co., 33 West Twenty-sixth Street, New mental iron and steel products, have removed their local offices to their new plant at 189-93 Banker Street, Brooklyn,

The H. B. Polak Mfg. Co., 279 Magnolia Avenue, Jersey City, N. J., has filed notice of organization to manufacture electrical equipment. Henry B. Polak is head.

The Florence Foundry Co., Florence, N. J., has awarded a contract to L. N. Shestack, 826 Arch Street, Philadelphia, for its new two-story foundry, 55 x 100 ft., to cost about \$50,000.

Robert Y. Barrows, Inc., Rutherford, N. J., has been incorporated with a capital of \$20,000 by Robert Y. Barrows, 102 Ridge Road, Rutherford; George H. Harman, Montclair, N. J., and Russell Fleming, Plainfield, N. J., to manufacture metal specialties.

The Johns-Manville Co., Manville, N. J., manufacturer of roofing specialties, etc., has completed plans for a one-story power house.

The Atlantic Mfg. Co., Hoboken, N. J., has been incorporated with a capital of \$150,000 by Bismark C. Moore, Harry Schwartz and Richard W. Gutheil, 51 Newark Street, to manufacture metal products.

Charles W. Simpson, 31 Clinton Street, Newark, N. J., engineer, and associates, have formed the Washington Structural Steel Co., to establish a plant at Washington, N. J. Property known as the Pine Brook farm has been acquired, and it is proposed to begin construction at an early date. The plant will have an initial capacity of about 1000 tons of structural shapes and material per month.

The Radio Spark Plug Co., Belleville, N. J., John Martin, representative, has changed its name to the Bec Mar Mfg. Co.

The Herfort Co., 921 Church Lane, North Bergen, N. J., has been incorporated with a capital of \$125,000 by Louis F. Beachner, John J. Fallon, Jr., and J. Harry O'Brien, to manufacture hardware specialties.

The Universal Tool & Novelty Co., 9-11 Halsted Street, Newark, N. J., has been directed by the Building Zone Commission to remove its plant to another location, the present works being in a restricted residential district.

The New York Auto Top & Supply Co., 260 Halsey Street, Newark, manufacturer of automobile tops and equipment, is taking bids for a new one-story plant at 1168-70 Broad Street, to cost about \$35,000.

The Lyraphone Co. of America, Woodland Avenue, near South Tenth Street, Newark, has completed plans for a power house $25\ x\ 36$ ft.

The Aeolian Co., Aeolian Hall. New York, manufacturer of piano players, player mechanisms, etc., has abandoned plans for its new plant at Hillside, near Newark, its recently acquired works at Willow Avenue and 138th Street, New York, filling the need for expansion.

The Magneto Generator & Repair Shop, 69 William Street, Newark, has filed notice of organization to manufacture magnetos and parts and operate a general machine works. Irving N. Yadwin, 558 Grove Street, Irvington, heads the company.

Morris Osherov, 406 Monroe Street, Passaic, N. J., has filed plans for a new one-story machine shop on Tulip Street, to cost about \$10,000.

The Central Garage & Machine Shop, Nutley, N. J., has been organized to operate a machine works for automobile parts manufacture, repairs, etc., at 558 Franklin Avenue. Thomas Hofner heads the company.

The Aeroil Burner Co., Inc., manufacturer of thawing outfits and torches, 266-270 Hudson Avenue, Union Hill, N. J., will remove its factory to a two-story brick building at 226-270 Hudson Avenue, Union Hill, providing three times more floor space. It will be in the market for drill presses, grinders, welding outfits, etc.

The Clymer Metallic Bed Co., Brooklyn, has been incorporated with a capital of \$40,000 by A. Ostroy, H. B. and J. Meiselman, 190 South Eighth Street, to manufacture brass and iron bedsteads.

Buffalo

BUFFALO, Oct. 25.

The E. R. Caldwell & Son Brass Co., 619 West Fayette Street, Syracuse, N. Y., is considering the erection of a new one-story foundry at West Fayette and Marcellus streets.

The Watson Truck Corporation, Canastota, N. V. has been incorporated with an active capital of \$2,150,000 by H. Canler, A. A. Kessler, and J. Souter, Canastota, to manufacture motor trucks and parts.

The United States Hame Co., 135 Tonawanda Street, Buffalo, manufacturer of hames and similar specialties, is arranging for an increase in its capital from \$1,000,000 to \$1,500,000.

The Chapin & Baker Mfg. Co., Edison Street, Syracuse, N. Y., manufacturer of gears, automobile transmissions, etc., is planning for the erection of a new plant on Manlius Street, East Syracuse, to consist of three one-story buildings, 65 x 180 ft., 40 x 100 ft., and 40 x 60 ft., respectively.

The Niagara Metal Stamping Corporation, Niagara Falls, N. Y., has filed notice of incorporation under Delaware laws, with capital of \$150,000, to manufacture stamped metal goods. C. R. Robinson is representative.

The Oswego Motor Car Co., Oswego, N. Y., has filed plans for the erection of a new three-story and basement service building and repair works, 100×100 ft., on East Bridge Street.

The Hunso Machinery Co., Buffalo, has filed notice of dissolution under State laws.

The Smith Glar-Stop Specialty Corporation, Watertown, N. Y., manufacturer of automobile equipment, has increased its capital to \$125,000.

The H. P. Snyder Mfg. Co., Sixth and West Main streets, Little Falls, N. Y., manufacturer of bicycles and parts, has preliminary plans under way for a five-story addition, 120 x 130 ft., to cost about \$120,000.

The Wescott Rule Co., Seneca Falls, N. Y., has filed notice of dissolution under State laws.

The A. J. Deer Co., West Buffalo Street, Hornell. N. Y., has filed articles of incorporation under Delaware laws, with capital of \$22,000,000, to manufacture electrically operated coffee mills, choppers, roasting machines, etc. Arthur J. Deer, L. G. Robbins and Condict M. Nevius, all of Hornell. are the incorporators.

Hider Brothers, 15 Grand Boulevard, Binghamton, N. Y., have filed plans for a new one-story and basement plant, 40 x 100 ft., at 91 Charlotte Street, for the manufacture of roller bearing specialties.

The Crosby Co., sheet metal stamping, Buffalo, is completing an addition to its plant and installing several large heavy presses.

New England

BOSTON, Oct. 25.

Quietness dominates the machine-tool trade. Houses are depending on the activities of salesmen who are selling single machines rather than lists. Few inquiries are coming in, and conservatism shown in buying is now preventing cancellations. However, sizable suspension of orders has come to New England tool builders from Great Britain, thought to be because of the coal strike in that country.

Builders are not inclined to lower prices because of the effect on possible buyers, who might be led to wait for further declines. Supply houses are not heavily stocked and a decline in prices and lack of business will not affect them seriously. The shortening of working schedules on the part of machinery makers continues, one of the most recent being the New Britain Machine Co., which, on Oct. 25, started operation on a 45 hr. week schedule, a 10 hr. reduction.

Contract has been awarded for the foundry addition for the H. Kasden Co., 19 Howe Street, New Haven, Conn., one story, 50 x 75 ft., costing \$10,000.

The Liberty Paper Co., Bellows Falls, Vt., will rebuild its plant at a cost of \$130,000. It will be three stories, 60 x 240 ft. Contract has been awarded.

Work has started on the \$3,000,000 power plant for the United Illuminating Co., Bridgeport, Conn.

The Eastern Mfg. Co. has started work on an extension to its paper mill at South Brewer, Me., 111 x 140 ft.

The Montague Machine Co., Avenue A, Turners Falls, Mass., has awarded a contract to the Foundation Co., 233 Broadway, New York, for a new one-story machine shop on Fifteenth Street, to cost about \$125,000 with equipment.

The Taft Carburetor Co., Inc., Hartford, Conn., has been incorporated with a capital of \$500,000 by L. E. White, East Waymouth, Mass., and W. A. Guile and J. J. Kinney, both of Providence, R. I., to manufacture carburetors and ignition equipment.

The Moback Tool & Machine Mfg. Corporation, Boston, has been incorporated with a capital of \$100,000 by Raymond D. Smith, Waltham; M. E. Buchanan, Newton; and Charles Gustafson, Watertown, to manufacture machinery, parts, and tools.

The United States Electric Co., New London, Conn., manufacturer of electric forges, hot water heaters and other apparatus, has acquired the local property of the J. N. La-Pointe Co., formerly occupied by the Forbes Co., for about \$65,000. The company recently filed notice of dissolution of its Connecticut charter to incorporate under Delaware laws with capital of \$500,000.

The Connecticut Blower Co., Inc., Hartford, Conn., has filed notice of active capital of \$200,000, to manufacture mechanical blower apparatus.

The United States Automobile Indicator Co., Bridgeport, Conn., has been incorporated with a capital of \$500,000 by Frank Maino and Gennar Striano, 90 North Washington Street, to manufacture indicating devices for automobile service.

The U. S. Cotton Machinery Co., Academy Building, Fall River, Mass., has filed notice of organization to manufacture machinery and parts. Joseph P. Phelan heads the company.

The Hersey Mfg. Co., 314 West Second Street, South Boston, Mass., manufacturer of machinery, has filed plans for extensions and improvements in its plant to cost about \$22,000.

The United States Screw Co., 26 Baker Street, Worcester, Mass., has filed notice of organization to manufacture screw attachments, etc. Henry Beland heads the company.

The Auto Metal Co., Providence, R. I., has been incorporated with a capital of \$50,000 by Charles and Louis Bolotow, 75-A Camp Street, to manufacture metal products.

The American Machine Co., Attleboro, Mass., has awarded a contract to the J. W. Bishop Co., Butler Exchange Building, Providence, R. I., for a one-story extension, 50 x 86 ft., to cost about \$20,000.

The Electric Parts & Service Co., Hartford, Conn., has been incorporated with a capital of \$50,000 by C. H. Schrag, 646 Windsor Avenue; J. H. Miller and E. G. Reinert, to manufacture electrical equipment for automobile service.

The Fidelis Phonograph Corporation, Augusta, Me., manufacturer of talking machines, is planning for the erection of an addition to its plant to cost about \$70,000.

The Nelson Mfg. Corporation, Boston, has been incorporated with a capital of \$200,000 by Albert H. Nelson, Frank L. Arthur, and Henry M. Williams, 100 Brattle Street, Cambridge, to manufacture machinery and parts.

The Williams Machine Company, Poultney, Vt., is opening a machine shop to manufacture special machinery, including dies, jigs, etc. It has installed lathes, planers, grinders, radial drills, presses, shears, etc., and is now in position to take on machine work of any description.

Philadelphia

PHILADELPHIA, Oct. 25.

Wild & Doess, 1834 North Sixth Street, Philadelphia, manufacturers of scientific instruments, have filed plans for a new one-story machine shop.

A. Taylor & Co., Commonwealth Building, Philadelphia, have awarded contract to John M. Kennedy, Jr., 406 South Van Pelt Street, for a one-story plant, 60 x 200 ft., on Cedar Street, Kensington, for the manufacture of wire specialties.

The Fox Motor Co., Broad and Huntington streets, Philadelphia, manufacturer of automobile equipment, parts, etc., has filed plans for its new three-story, reinforced concrete plant, 60 x 400 ft., at Seventh Street and Orange Avenue, to cost about \$300,000, including machinery.

Morris and Samuel Siegel, Philadelphia, and associates, are organizing the Jefferson Brass Foundry & Mfg. Co., to manufacture brass, bronze and other metal products. Application will be made for a State charter at an early date. Ellis Rudman, Philadelphia, represents the new company.

The Philadelphia Electric Co., Tenth and Chestnut streets, Philadelphia, is planning for the installation of a number of machine tools.

The F. J. Stokes Machine Co., Seventeenth and Cambria streets, Philadelphia. is taking bids for a new plant at Perry Street and Tabor Avenue.

The Vorolite Metals Co., Philadelphia, has filed notice of increase in capital from \$1,000,000 to \$1,500,000.

The Commercial Truck Co., Twenty-seventh and Brown streets, Philadelphia, manufacturer of automobile trucks, has acquired two lots at the corner of Vine and Franklin streets, 79 x 172 ft. and 79 x 105 ft., respectively, and adjoining land on Wood Street, 67 x 80 ft., for \$70,000. The site will be used for a new plant.

The Albertone Phonograph Co., Trenton, N. J., has been incorporated with a capital of \$25,000, by Albert Hughes, 150 East State Street; Charles C. Kulp and Clarence Connell. The company will manufacture a new talking machine invented by Mr. Hughes, who will be head of the company.

The Atlantic City Tire & Rubber Corporation, Atlantic City, N. J., has acquired property at Virginia and Mediterranean avenues, as a site for a new plant with a daily capacity of 400 tires and 500 tubes.

The New York Shipbuilding Co., Camden, N. J., has orders on hand to insure capacity production for many months. Seven passenger vessels will be built for the United States Shipping Board; four tankers for the Vacuum Oil Co.; and fifteen passenger and cargo ships for other interests. The yard is now giving employment to about 18,650 men.

The Armstrong Truck Co., Walnut Street, North Wales, Pa., manufacturer of trucks, wagons and parts, has awarded a contract to John Hohlefelder, Jenkintown, Pa., for a two-story addition, 42 x 85 ft., with extension, 30 x 55 ft., It is estimated to cost \$75,000.

The Tompkins Rubber Mfg. Co., Narberth, Pa., has been incorporated with a capital of \$300,000 by James H. Stitzer, T. Ewing Montgomery and Ernest E. Tompkins, Narberth, to manufacture rubber products,

The Allentown Sanitary Products Co., 11 South Center Square, Allentown, Pa., recently organized with a capital of \$500,000, is planning for the erection of local works for the manufacture of a special leakless siphon valve. Pending the establishment of the new plant, a contract has been placed with the Penn Foundry Co., Bath, Pa., for the manufacture of about 20,000 valves, with production at the rate of 200 valves per day. Charles Lenhart is president, and John Graeflin, treasurer.

T. Richardson & Son, Bridgeport, Pa., have completed plans for a one-story boiler shop, 35 x 70 ft., at Fourth and Depot streets, to cost about \$20,000.

The Lehigh Structural Steel Co., Allentown, Pa., has increased its capital from \$100,000 to \$1,000,000 and work is under way on extensions. New equipment will be installed and a number of new cranes and electrical hoists have recently been placed in service. R. L. Kift is general manager.

The Northumberland Forging Co., Northumberland, Pa., manufacturer of automobile parts and other forgings, will curtail operations at once in a number of departments. The reduction is due to recent cancellation of orders.

C. A. Pidcock, 11 South Warren Street, Trenton, N. J., has plans under way for the erection of a new machine shop at Morrisville, Pa., to specialize in motor car work and to cost about \$30,000.

The Reading Iron Co., Reading, Pa., has discontinued remodeling its plant at Columbia, Pa., formerly the Susquehanna Rolling Mills. The action, is is said, is due to recent labor troubles.

The Alpha Portland Cement Co., Easton, Pa., a new Jersey corporation, has increased its capital from \$10,000,000 to \$25,000,000.

The Smith-Waring Corporation, Third and Locust streets, Harrisburg, Pa., has acquired the factory of the Harrisburg Baking Co., on South Cameron Street, for about \$75,000, for the manufacture of a new tractor-cultivator for small farm use. The site totals 100 x 350 ft., with main building of brick and steel, aggregating 14,000 sq. ft. of floor space, with adjoining two-story brick structure in the rear. Possession will be taken on Jan. 1. For initial work the plant will be used for assembling and certain precision operations, with parts production arranged for under contract at outside plants. Henry Waring is president.

Pittsburgh

PITTSBURGH, Oct. 25.

The machinery trade in this district still is marking time. Such inquiries as are coming out in practically all cases are more for the purpose of finding out where prices are than because buyers have any real idea of placing orders. The expectation that prices will be lower is so common that few people want to commit themselves at the moment, and a number of projects which a short time ago seemed in a fair way to be closed, now appear to have been indefinitely deferred.

While no outright reductions have been made in prices, there is not enough business to give all a share and this means sharp competition and a market very much in favor of the buyer.

The National Gear & Truck Wheel Co., Pittsburgh, is having plans prepared by George O. Rogers, Penn Building, architect, for a number of one-story buildings at Vanport, Pa. Mr. Rogers will handle all details and bids.

The Electric Appliance Co., Pittsburgh, Pa., has increased its capital from \$300,000 to \$400,000.

Fire, Oct. 17, destroyed a portion of the works of the John Eichleay, Jr. Co., South Twentieth and Wharton streets, structural iron and steel, with loss estimated at \$50,000.

The Damascus Tool Co., Pittsburgh, is being organized by George W. Evans, William G. Prescott and George W. See, care of Shoemaker & Knoell, 434 Diamond Street, to manufacture tools and machine parts, castings, forgings and stampings. Application will be made for a State charter.

The Grier Brothers Co., 134 Second Avenue, Pittsburgh, manufacturer of tinware, stamped metal goods, etc., has leased a five-story brick factory at 1411 Brighton Road, near Pennsylvania Avenue, with site, 84 x 100 ft., for 10 years. The structure will be remodeled at a cost of about \$40,000 and possession will be taken near the end of the year and the present plant moved to the new location.

The Pittsburgh Screw & Bolt Co., Preble Avenue, Pittsburgh, manufacturer of bolts, nuts, rivets, etc., has filed plans for a two-story steel and concrete addition on lower Preble Avenue, to cost about \$135,000. A steel mezzanine floor will also be placed in one of the buildings at the plant at a cost of \$20,000.

The Blaw-Knox Co., Farmers Bank Building, Pittsburgh, has taken bids for a two-story extension, 81 x 90 ft., at its plant at Hoboken, Pa.

A number of buildings, including the machine shop, at the power plant of the West Penn Power Co., Pittsburgh, at Springdale, were destroyed by fire, Oct. 19, with loss estimated at \$150,000.

The Struthers-Wells Co., Pennsylvania Avenue, Warren, Pa., manufacturer of boilers, tanks, stacks, etc., has taken bids for a one story, brick and steel forge shop, 68 x 140 ft., and one and one-half story boiler plant, 40 x 85 ft., to cost about \$100.000.

The Columbia Steel Shafting Co., has acquired about 48 acres of land on Duss Avenue, near the Ohio River, Ambridge, Pa., for \$160,000, which it will use for a new plant.

The Allen Machine Co., Twelfth Street and East Avenue, Erie, Pa., manufacturer of tubing machinery, etc., has taken bids for a one story foundry addition, 60 x 250 ft. Edward E. Allen is president.

The Skinner Engine Co., Twelfth and Chestnut streets, Erie, Pa., manufacturer of stationary engines and parts, has completed the erection of a new power plant and plans to begin construction at an early date on a one-story shop addition, 60 x 270 ft., to cost about \$45,000. A. D. Skinner is head.

The Keystone Motors Co., Main and Third streets, Lewistown, Pa., has arranged for the erection by day labor of its new two-story service and repair works, 180 x 200 ft., to cost about \$100,000.

Plans are being prepared for the superstructure of the automobile tire manufacturing plant to be erected by the Shenango Tire & Rubber Co., First National Bank Building, Greenville, Pa. It will be one and two stories, 60 x 255 ft., and is estimated to cost \$175,000, of which about \$100,000 will be expended for machinery. C. E. Shurpliffe is president. The Akron Engineering Co., 92 Mill Street, Akron, Ohio, is architect and engineer.

The Crane Co., 636 South Michigan Avenue, Chicago, manufacturer of piping, valves, steam specialties, etc., has plans under way for a new pipe shop at Twenty-fourth Street and the Allegheny Valley Railroad, Pittsburgh.

The Garfield Steam Truck Co., Garfield, Ohio, has been incorporated with a capital of \$1,000,000 by James J. Mac-Mahon, E, and Duncan MacDonald, Garfield, to manufacture steam-operated trucks.

The Star Car & Foundry Co., Huntington, W. Va., has been incorporated with a capital of \$750,000 by J. H. Shirer, M. J. Ferguson and F. W. McCullough, to manufacture cars, car wheels, iron and steel castings, etc.

The Union Electric & Machine Co., Charleston, W. Va., manufacturer of electrical machinery, parts, etc., has increased its capital to \$50,000.

The American Thermos Bottle Co., Madison Avenue and Forty-sixth Street. New York, has let contracts to the Arnold Co., 105 South La Salle Street, Chicago, for its proposed new plant at Huntington, W. Va., to consist of

two one-story structures, about 300 x 600 ft., each, estimated to cost in excess of \$2,000,000, with machinery.

The New River Co., MacDonald, W. V., has awarded a contract to the Austin Co., Cleveland, for a one story machine shop, 90 x 120 ft., and general service and warehouse building, 100 x 220 ft., estimated to cost about \$200,000, with equipment. A list of machine shop equipment has been prepared; M. J. Moore is purchasing agent.

The Meek-Dennison Mfg. Co., Huntington, W. Va., has been incorporated with a capital of \$50,000 by E. C. Meek, R. C. Dennison and V. G. Bryan, to manufacture electric signs and other electrical equipment.

The Monongahela Valley Traction Co., Parkersburg, W. Va., has plans under way for extensions in its electric generating plant to double, approximately, the present capacity,

G. G. Stuart, Cleveland, is president of the Wickman Screw Works, with a plant at 420 Neptune Street, W. E., Pittsburgh, recently incorporated under the laws of Pennsylvania with a capital of \$50,000. Associated with Mr. Stuart are O. C. Zimmerman, formerly connected with the Pittsburgh Screw & Bolt Co., who is general manager; E. V. Hays, treasurer, and H. M. Wickersham, secretary, all of Pittsburgh. The company manufactures machine screws, having four of the latest type of automatic screw machines in operation.

Indiana

INDIANAPOLIS, Oct. 25

The Roussey Centlivre Rubber Co., 1606 Maumee Avenue, Fort Wayne, Ind., A. J. Roussey, president, has completed plans for a new factory at 3117 Maumee Avenue, to cost about \$45,000.

The Keith Railway Equipment Co., Hammond, Ind., manufacturer of tank cars, etc., has arranged for a note issue to total \$1,500,000.

The Burdick Tire & Rubber Co., 10 South La Salle Street, Chicago, is considering the erection of a two-story plant at Noblesville, Ind., to cost about \$40,000.

The Merchants Heat & Light Co., Washington and Meridian streets, Indianapolis, has had plans prepared for a one-story addition to its power house. Chas. Brossman, Merchants' Bank Building, is engineer.

The Link Belt Co., South Addison Street, Indianapolis, has filed plans for a new one-story plant on Belmont Ave-

The Money-Back Mfg. Co. Knightstown, Ind., has been incorporated, with \$100,000 capital stock, to manufacture automobile accessories. The directors are A. J. Heliker, E. M. Sherburne and F. J. Newby.

The Anderson Die & Model Co., Anderson, Ind., has increased its capital stock from \$10,000 to \$100,000.

The U. S. Slicing Machine Co., Laporte, Ind., has increased its capital stock from \$1,000,000 to \$1,500,000.

The Mattingly Mfg. Co., Rockport, Ind., has been organized, with \$50,000 capital stock, to manufacture a cultivator invented by Ray S. Mattingly. The officers are; President, R. W. Richards; vice-president, John G. Haines; secretary-treasurer, Fred H. Crowder.

The Maxwell Implement Co., Valparaiso, Ind., has increased its capital stock from \$90,000 to \$150,000.

Cincinnati

CINCINNATI, Oct. 25.

New machine-tool business is at a standstill and manufacturers are fairly well caught up on old orders. plants have been operating overtime in efforts to catch up with deliveries so that orders could not be cancelled for nondelivery on dates originally set, but regular time will be the rule from now on. No reductions in working forces are re-ported and very few machines are being manufactured for Inquiries are confined almost exclusively to single stock. tools. Some railroad buying was done last week, the St. Louis & San Francisco purchasing five 14-in, and one 21-in. engine lathes, and the Tennessee Coal, Iron & Railroad Co., A local machine-tool manufacturer retwo engine lathes. ports that during this month he will ship over \$100,000 worth of tools to Europe and the Far East. At present foreign business is practically at a standstill, although some inquiries are coming from railroads operating in South American countries. Machinery dealers state that so far this month sales compare favorably with the month of August and are running ahead of September. The used machinery market is only fair. Foundries are working four and five days a week, but no further reduction in forces is reported.

The Cincinnati Auto Spring Co., recently incorporated by L. W. Kinney and H. R. Edwards, has purchased property on Reedy Street, and contemplates the erection of a plant for the manufacture of automobile springs.

The Buckeye Steel Castings Co., Columbus, Ohio, contemplates increasing its capital stock by issuing 25,000 shares of common stock of a par value of \$100 per share. A special meeting of the stockholders will be held on Nov. 17.

The American Tractor & Implement Co. has been incorporated with \$400,000 to manufacture a four-wheel-drive farm tractor, trucks and other equipment. It has purchased the property of the Washington Mfg. Co., at Washington Court House, Ohio, and will remodel the plant. Edwin Mc-Farland, Cincinnati, is president and H. C. Hubbell, general manager.

The plant of the C. L. Green Co., spring manufacturer, Cincinnati, was damaged by fire to the extent of over \$100,-000 on Oct. 21. It had completed plans for a new factory at Chase and Dane avenues, Cumminsville, a Cincinnati suburb, construction of which had not been contemplated until spring, but it is probable that arrangements will be made to go ahead with the new buildings at once. In the meantime temporary quarters will be secured until the new structures are ready for occupancy.

The United States Air & Motor Engineering Co., Galion, Ohio, has been incorporated with a capitalization of \$200,000, and contemplates erecting a plant. It has been manufacturing motors but it is understood will build aeroplanes for commercial use. Chester C. Hartle is president.

The Trailmobile Co., Cincinnati, will increase its capitalization from \$680,000 to \$1,500,000 for the purchase of property on which its new plant in the Oakley district is located, and to provide for the growth of its business. The company manufactures automobile trucks and trailers.

The American Blower Co., Detroit, is having plans prepared for extensions and improvements in its foundry at Cincinnati, to cost about \$90,000.

The Capitol City Products Co., Columbus, Ohio, has awarded a contract to R. H. Evans, Columbus Savings & Trust Building for a two-story and basement oil refinery, 50 x 100 ft., to cost about \$100,000 with equipment.

The Chevrolet Motor Car Co., Pickering Building, Cincinnati, will soon take bids for a one story and basement assembling and service works, 60 x 245 ft., on Gilbert Avenue, to cost about \$90,000.

Detroit

DETROIT, Oct. 25.

A slight increase in machine tool inquiries is observable, although the market continues extremely quiet and few orders are coming through.

The Stromberg Devices Co., Detroit, is ready to launch an expansion program. A. E. Shepard, manager, is now in the east in connection with the project.

The American Machine Products Co., Eighth and Howard streets, Detroit, has let contract for a new one-story factory.

The Detroit Twist Drill Co. has established a plant at Walkerville, Ont., to handle its rapidly growing Canadian business. High speed drills and reamers will be manufactured. The nucleus of the Walkerville organization was formed from the Detroit factory. About 30 men are employed and manufacturing operations have begun. Muir B. Snow, Detroit, is president of the Canadian company.

The Sterling Furnace Co., Grand Rapids, Mich., has been incorporated with a capital of \$30,000 by F. D. Stevens, Charles E. Miller and Neal W. Taplin, to manufacture furnaces and other heating equipment.

The Buhr-Buiwitt Co., Detroit, has changed its name to the J. F. Buhr Machine Tool Co.

The Wildman Rubber Co., Book Building, Detroit, will defer construction until next spring on its proposed three-story and basement plant at Bay City, Mich., 240 x 345 ft., estimated to cost close to \$1,000,000. Prior to this time it is expected to take bids on foundation work and begin this part of construction. J. C. McCabe is secretary.

The Hayes Electric Co., Detroit, manufacturer of electrical specialties, has filed notice of change of name to the Hayes Home Appliance Co.

The Multitool Mfg. Co., Lansing, Mich., incorporated about a year ago with capital of \$10,000, has arranged for the establishment of a local plant to manufacture blades and adjustments for special agricultural tools. Up to the bresent time it has been manufacturing its specialties at other plants. G. D. Willard is president, and Roy L. Smith, secretary-treasurer.

The Motor City Stamping Co., Detroit, is having plans prepared by Stahl & Kinsey, 435 Woodward Avenue, archi-

tects, for a new one-story brick plant, 98 x 100 ft., on Kno-.ell Street, to cost about \$70,000.

The Superior Combustion Engine Corporation, Detroit, has been incorporated with a capital of \$500,000 by Rufus A. Shorey, Arthur J. Crosbie and Richard P. Grieve, 515 Cass Avenue, to manufacture internal combustion engines and other automotive equipment.

The Tuthill Spring & Service Co., Detroit, has been incorporated with a capital of \$30,000 by John B. Philips, Lewis F. Elkins and Walter H. Cochran, 780 Lenox Avenue, to manufacture automobile springs and metor parts.

The Reliance Elevator Co., 212 West Austin Avenue, Chicago, has arranged for the immediate remodeling of the plant of the Palmer Tire & Rubber Co., St. Joseph, Mich., recently acquired for its new branch plant. It is expected to have the structure ready for machinery installation by the close of the year. About 150 men will be employed for initial operations.

Cleveland

CLEVELAND, Oct. 25.

Both inquiries and sales continue light. The demand is mostly for machinery for cutting down maintenance costs rather than for production and consequently some types of grinding machines are moving better than some other lines of machinery. A large part of the inquiry is for second-hand tools which are going at somewhat lower prices than recently prevailed. The only order of any size placed the past week was for a 35-ft. bending roll, a \$44,000 machine, that the Warren City Tank & Boiler Co., Warren, Ohio, was able to secure for immediate delivery. One inquiry for 12 machines is pending for a proposed new plant in Cleveland.

Some prospective business is still being held up because of the expectation of lower prices, but machine-tool builders state that manufacturing costs are as high as ever and until these are reduced they cannot come down on prices. Many prospective purchasers are asking that prices be guaranteed for six months and these requests have been made in some cases by buyers purchasing machines from dealers' stocks, deliveries of which will be made immediately. Some business is coming from the railroads, mostly in single machines, and a local manufacturer of drilling machines has recently taken from Detroit automobile manufacturers a few orders for machines to round out their equipment.

There is considerable inquiry for hydraulic turbines from paper manufacturers and from Pacific Coast plants. Several inquiries for turbines have also recently come from Japan.

D. D. Wessles & Son. 1385 East Seventeenth Street, Cleveland, makers of concrete tubs, are planning the erection of a two-story factory, 107 x 116 ft.

The Universal Crane Co., 1100 Swetland Building. Cleveland, has a contract for the erection of a one-story factory, 118 x 150 ft., to be built in Elyria, Ohio.

The United States Air & Motor Engineering Co., Galion, Ohio, has been incorporated with a capital stock of \$200,000, and contemplates the erection of a plant for the manufacture of airplanes. Chester C. Hartle is president and Frank Pigman, secretary.

The Interstate Aluminum Co., Canton, Ohio, will enlarge its plant by the erection of an addition to cost \$15,000.

The Industrial Appliance Co., Massilion, Ohio, has been incorporated to manufacture pressed metal products and will equip a leased plant. Later it expects to erect a new building. J. O. Lewis is president.

The Marsh Auto Accessory Co., Norwalk, Ohio, is planning the erection of a one-story factory, 40 x 80 ft.

The National Drawn Steel Co., East Liverpool, Ohio, contemplates the erection of a one-story factory, 100 x 170 ft.

The Wagon Mfg. Co., Sidney, Ohio, is having plans prepared for a foundry, 80 x 180 ft.

The Superior Brass Co., Mansfield, Ohio, is planning the erection of a foundry, 40 x 65 ft.

The Brookside Brass Foundry & Mfg. Co., Cleveland, has increased its capital stock from \$20,000 to \$50,000.

Baltimore

BALTIMORE, Oct. 25.

The Baltimore & Ohio Railroad, Baltimore, has begun preliminary work in connection with the electrification of certain sections of its line, including the Seventeen Mile Grade district, between Piedmont, W. Va., and Altamont, Md. It is proposed to build a number of hydroelectric power plants for the service, and sites for the two primary generating stations have been selected on the Cheat River, near Rowlesburg, and on the Savage River, near Piedmont, W. Va.

The St. Mary's Auto & Implement Co., Leonardtown, Md., has been incorporated with a capital of \$50,000 by J. Allan Good, Leonard B. Johnson, Bower Hodges and James C. Burch, to manufacture automobile equipment, agricultural implements, etc.

The High Tension Supplies Co., Ridgely, Md., has been incorporated with a capital of \$100,000 by Richard R. Kenney and D. Thompson Swing, Ridgely, and William F. Hoey, Frederica. Del., to manufacture high power electrical apparatus.

A. L. Flint, general purchasing officer, Panama Canal, Washington, will receive bids up to Nov. 3, for galley pumps, foundry nails, leather belting, fusible plugs, and other equipment, as set forth in Circular 1414.

Fire, Oct. 16, destroyed a portion of the naval air station of the Government at Anacostia, near Washington, with loss estimated at \$1,000,000. Among the structures burned were machine shops, power and heating plant, and other mechanical buildings.

The Baxter & Allen Iron Works, Charleston, S. C., has been organized to manufacture iron and steel products. Thomas B. Allen heads the company.

The Newport Shipbuilding Co., Newbern, N. C., is planning the construction of a new shippard at Wilmington, N. C.

S. W. Snitzer, 3454 Reisterstown Road, Baltimore, has been granted a permit to build a three-story garage and automobile repair shop, 60 x 90 ft., at 1419-23 Maryland Avenue, to cost about \$20,000.

An automobile repair shop will be established at Paca and Redwood streets, Baltimore, by the Maccar Motor Truck Co., 1010 West North Avenue. Prices are wanted on equipment.

The Fidelity Mfg. & Repair Co., Williamston, N. C., has been organized and will build a plant to repair motor vehicles. Prices are wanted on equipment. Ashley Cromwell is president and W. V. Ormond, manager.

Plans for the establishment of a factory for the manufacture of agricultural implements are being made by David Stewart, Clio, S. C. Quotations are wanted on foundry equipment, machine tools, etc.

The capital stock of the Atlantic Welding Works, Columbia, S. C., has been increased from \$20,000 to \$25,000.

Chicago

CHICAGO, Oct. 25.

In its broader aspects the market shows no signs of change, new business being limited and collections on old accounts difficult. Although some cancellations are being received, heavy losses of business on that account were borne earlier in the year when the tractor industry began to retrench. Prices remain stationary, but a number of manufacturers have expressed willingness to guarantee against declines without, however, stimulating business. The Northwestern, Santa Fe and Illinois Central have taken no further action on their pending lists. From St. Louis comes the report that the Wabash will issue an extensive list. Industrial consumers are still delaying their buying, apparently because they expect price reductions or funds are not available to finance purchases at this time. Although even yet dealers and manufacturers are reluctant to admit that early price reductions are to be looked for, in view of high production costs, the expectation of consumers first given impetus by the fall in automobile prices has been given further encouragement by Judge Gary's address before the American Iron and Steel Institute. At the same time the latter's speech was regarded as reassuring as to the prospects for an early resumption of business activity, notwithstanding the fact that it intimated that such a resumption will come on a lower level of commodity prices. The delivery problem is a thing of the past, as dealers are well stocked and most manufacturers can make early shipments against new orders. In anticipating sales records for the month of October, some sellers fear that their totals will be the lowest since before the war. regard Nov. 2 as a probable turning point in business, but it is fair to state that this feeling is founded on the belief that there will be a change in national administration

The C. H. Millis Foundry Co., Twenty-first Place and Rockwell Street, Chicago, has let contract for a one-story foundry, 32 x 100 ft. and 82 x 163 ft., at 2201-25 West Thirty-fifth Street, to cost \$70,000.

The Waltham Motors Corporation, 401 North Hoyne Avenue, Chicago, has let contract for a shop, 48 x 100 ft., to cost \$12,000.

The Peerless Light Co. has purchased the six-story building and land it occupies at the southeast corner of Washington Boulevard and Union Street, Chicago, and has expended \$175,000 in modernizing it to meet its requirements. The

company manufactures lighting fixtures, electrical specialties and distributes all kinds of electrical supplies.

The National Casting & Foundry Co., Decatur, Ill., plans to erect a foundry, 60×64 ft., to cost \$9,000.

The Supreme Foundry Co., Inc., Belleville, Ill., recently organized with \$20,000 capital stock, has leased a foundry and will manufacture gray iron castings. The officers include: President, N. L. Gansman; vice-president, E. Stomwater, and secretary and treasurer, Hugo Heisler.

The Northwestern Barb Wire Co., Sterling, Ill., contemplates the construction of a five-story plant, 48 x 86 ft.

The Northern Steel & Iron Co., Fulton, Ill., recently organized, has expended \$75,000 on a plant for the manufacture of automotive parts and accessories. It is undecided when operation will be begun.

The Moline Pressed Steel Co., East Moline, Ill., has received a large contract for fenders and bodies for a truck to be manufactured by the International Harvester Co. It is expected that the contract will keep the East Moline plant busy until July I, and to meet the order a new enameling room, 50 x 150 ft., will be built.

The Great Western Stove Co., Leavenworth, Kan., is having plans prepared for an enameling plant, 80 x 125 ft., to cost \$60,000.

The Sandusky Portland Cement Co., Dixon, Ill., has awarded a contract to the Pan-American Steel Co., Evansville, Ind., for a one-story power house addition to cost about \$100,000.

Fire, Oct. 14, destroyed the plant of the Paris Tire & Rubber Co., Paris, Ill., with loss estimated in excess of \$500,000, including machinery.

The Chicago Steel Spring Co., Chicago, has awarded a contract to the Hughes-Foulkrod Co., Commonwealth Building, Philadelphia, for an addition to its plant to cost about \$75,000.

The Chicago Nipple Mfg. Co., 910 West Lake Street, Chicago, manufacturer of pipe fittings, a Delaware corporation, has arranged for a reduction in its authorized capital from \$10,000,000 to \$5,000,000.

Milwaukee

MILWAUKEE, Oct. 25.

New machine-tool business is lacking in appreciable volume. Milling machine builders are getting a few scattering requirements and manage to keep fairly busy on old orders or that part not subjected to cancellations. The tone of inquiry has shown slight improvement in the past week, but it is evident that prospective buyers are seeking concessions in prices, which do not appear to be forthcoming.

Founders note some falling off in orders, but not enough to make it necessary to dispense with any considerable part of their operating forces. Only those specializing in the smaller castings, such as automotive requirements, feel a serious effect.

Structural shops discern some improvement, one shop reporting two fair-sized jobs in Wisconsin taken the past week.

The Milwaukee Boiler Mfg. Co., 220 Oregon Street, Milwaukee, which was incorporated recently with \$200,000 capital as a development of the old Milwaukee Boiler Co., has decided to proceed immediately with the erection of a new brick and steel shop, 140 x 180 ft., on a new site at Thirty-fifth Avenue and Scott Street, West Milwaukee. Contract has been let to the Wisconsin Bridge & Iron Co., Milwaukee. A miscellaneous list of equipment is now being purchased. W. D. Johnson is president and general manager.

The Keystone Structural Steel Co., Milwaukee, has been organized by O. Lubinski and W. L. Roley, to engage in business as designer and fabricator. A temporary office and shop has been established in leased quarters at 711 Chestnut Street. Early next spring it intends to provide larger and more permanent facilities, either by erecting a shop or leasing an existing building. Mr. Lubinski, president and general manager, formerly was connected with the McClintic-Marshall Co., Pittsburgh, and more recently had charge of structural steel and reinforcing bar work for H. Schmitt & Sons, general contractors, Milwaukee.

The Moloch Co., Kaukauna, Wis., incorporated recently with \$750,000 capital to take over the business formerly conducted as the Moloch Automatic Stoker Co., has awarded contracts for the first unit of its machine shop and erecting floor, 60 x 120 ft., of brick and steel. The general contractor is the Ludolf H. Hansen Co., Green Bay, Wis. Considerable new equipment for manufacturing automatic stoking equipment for power plants will be installed.

The Waukesha Motor Co., Waukesha, Wis., is preparing to extend its facilities by installing additional machine tool equipment, to finance which a new issue of 8 per cent preferred stock is being marketed locally. The immediate reason for the expansion is the booking of an order for 10,000 motor truck engines, valued at more than \$5,000,000, which with other orders indicates a production valued at more than \$10,000,000 for 1921, or twice the business of the present year. Future orders amounting to \$10,000,000 are contingent upon the execution of the new order. The official statement concerning this contract does not give the name of the purchaser, but it is intimated that it is the motor truck division of the International Harvester Co. Harry L. Horning is president and chief engineer Waukesha Motor Co.

The Mechanical Equipment Sales Co., Milwaukee, has been granted a charter with a capital stock of \$5,000, to manufacture mechanical devices and equipment. The incorporators are Hans E. Birkholz, president and manager, and Richard G. Birkholz, secretary-treasurer Birkholz Engineering Co., Inc., "mechanical engineer and machinery designer, 821-823 M. & M. Bank Building, Milwaukee.

The Princeton Light & Power Co., Princeton, Green Lake County, Wis., has engaged the Jacobsen Engineering Co., 532 Metropolitan Bank Building, Minneapolis, Minn., to design and construct a new hydroelectric generating plant. The estimated cost is \$75,000.

The Antigo Foundry Co., Antigo, Wis., has been organized by A. L. Hyams and C. J. Nelson, to manufacture gray iron, bronze and aluminum castings. The shop of the former International Hoist Co., owned by Mr. Hyams, will be converted into a foundry and machine shop, but only a small list of new equipment will be needed at this time. Mr. Nelson is general manager.

The American Auto Body Co. of Green Bay, Wis., newly organized by John Perry, Willard and Earl Fraser, all of Appleton, Wis., has taken over the plant of the former Key Calk Horseshoe Co., and wid equip it for manufacturing passenger and commercial car bodies, truck cabs, etc. The initial output will be ten bodies daily. Most of the machinery has been purchased.

The Optenberg Iron Works, Sheboygan, Wis., will build a one-story brick forge and blacksmith shop addition, 40 x 100 ft., at Clara Avenue and South Seventh Street. Some additional equipment is being purchased. R. W. Busse is president and general manager.

The Milwaukee Specialty Mfg. Co., Milwaukee, has been incorporated with a capital stock of \$15,000 to manufacture hardware and other specialties. The incorporators are Theodore W. Arntz, Albert C. Ziemann and Otto P. Werner, 743 Fourteenth Avenue.

The Ashland Machine & Paper Co., Ashland, Wis., incorporated some time ago with \$150,000, has leased a part of the Bretting Iron Works and is installing additional equipment for manufacturing patented machines for coating tissue and waxed papers, designed by John A. Martin, who is vice-president and chief engineer.

The Ericksen Pattern & Mfg. Co., Spring and Front streets, Beaver Dam., Wis., is now under the ownership and management of James Ericksen and J. A. Schauer, who purchased the third interest of C. J. Larson.

The Zwebell Brothers Co., 482 Milwaukee Street, Milwaukee, manufacturer of patented tire repair molds and equipment, will build a machine shop, 60 x 100 ft., at Schleisingerville, Wis., near Milwaukee. The work is in charge of Judell & Bogner, architects, Colby-Abbot Building.

The Master Seeder Co., 1205 Twentieth Street, Milwaukee, which was established early this year to manufacture drills, seeders and other farm implements, is negotiating for a site for permanent works at Kenosha, Wis. No definite arrangements have been made, however. H. A. Zimmermann is president.

California

Los Angeles, Oct. 19.

The Matteson Mfg. Co., Stockton, Cal., recently incorporated with a capital of \$1,500,000 to manufacture motor-driven tractors, has acquired about 15 acres in the West Lane district as a site for a new plant. Plans are being prepared for the first unit, estimated to cost about \$150,000, and it is proposed to begin construction early in January. The company is headed by W. C. Matteson, A. V. Keyes, and F. B. Putnam.

The Los Angeles Steel Ball Co., Los Angeles, has been incorporated with a capital of \$200,000 by J. T. Kerr, F. N. crobbs and G. D. Meiklejohn, to manufacture ball bearings and other steel specialties.

The Seacraft Corporation of California, Los Angeles, recently incorporated, with capital of \$250,000, has acquired the plant of the Marine Equipment Co. at Wilmington, Los Angeles Harbor, which it will improve with new machine and metal working shops and shipways. It will specialize in the building of pleasure craft. F. A. Featherstone is president, and Marco Hellman, treasurer.

The Los Angeles Shipbuilding & Drydock Co., Los Angeles, has arranged for a bond issue of \$1.250,000.

The Federal Rubber Co., San Francisco, has rejected all bids for its new plant on West Second Street, and construction will be held in abeyance. The lowest bid was \$155,900. Edward G. Garden, 781 Flood Building, is architect.

Fire, Oct. 5, destroyed a portion of the plant of the Mason By-Products Co., Sausalito, Cal., with loss estimated at \$150,000, including machinery. It is planned to rebuild at an early date.

The Lewis Automatic Water Heater Co., 4618 Central Avenue, Los Angeles, has been organized to manufacture water heaters and parts. W. G. Lewis heads the company.

The Shartzer Illuminated License Plate Co., Oakland, Cal., manufacturer of automobile license plates and other metal specialties, has plans under way for three one-story buildings, each 40 x 120 ft., and one-story office. 35 x 55 ft., to cost about \$60,000. Bids will be asked early in November. Edward Demar. 5760 Shafter Avenue, Oakland, is architect.

The White Aircraft Works, Los Angeles, has filed notice of organization to manufacture airplanes and parts. George White, 3832 South Main Street, heads the company.

A. P. Seybold, 1213 Hobart Building, San Francisco, has filed application with the State Water Commission for permission to appropriate water from the Klamath River and Bluff Creek, Humboldt County, to be used for hydroelectric power development. The applicant with associates, plans for the erection of an electric generating plant in this district to cost about \$2,000,000.

The City Council, San Francisco, has directed M. M. O'Shaughnessy, city engineer, to prepare plans for the proposed municipal hydroelectric power plant to be constructed in connection with the Hetch Hetchy waterworks project. With machinery it is estimated to cost about \$5,000,000.

The Gulf States

BIRMINGHAM, Oct. 25.

The Conners Steel Co., Brown-Marx Building, Birming-ham, Ala., has completed plans for a new one-story works on Powell Avenue, 75 x 400 ft., to cost about \$50,000. It will be equipped for steel casting production.

The Cisco Clay & Coal Co., Cisco, Tex., recently organized with a capital of \$250,000, has leased about 150 acres and plans the erection of a new brick manufacturing plant with initial daily capacity of about 50,000 bricks. Clay excavating machinery, drying equipment, molding machinery and other apparatus will be installed.

The Shiner Compress Co., Cuero, Tex., is planning for a new cotton ginning plant, 120 x 700 ft., at Shiner, Tex., to cost about \$60,000, to replace the one recently destroyed by fire. V. J. Grunder is president and manager.

The Cameron Iron Works, Houston, Tex., recently organized, will operate a local plant for the manufacture of oil-well machinery and supplies. J. S. Abercrombie is president and treasurer.

The Big Four Coal Co., North Birmingham, Ala., is planning for the construction of a new tipple at its properties, to replace the structure recently destroyed by fire. S. B. Shelbourne is head.

The Richard Carter Co., Gulfport, Miss., recently incorporated with a capital of \$1,000,000, to manufacture marine and stationary engines, trucks, tractors and parts, has arranged for the immediate erection of a plant on a 20-acre site. Richard Carter is president.

The Oldsmar Electric Light & Ice Co., Oldsmar, Fla, has filed plans for an addition to its electric power plant, 30×50 ft., to cost about \$25,000. James H. Thompson is president and general manager.

New equipment is to be installed and the capacity of the ice factory of the Southern Cold Storage & Ice Co., San Antonio, enlarged to 70 tons per day. The improvements will cost about \$125,000.

The Beaumont Marine Engineering Works, Beaumont, Tex., has been incorporated with a capital of \$15,040 by J. C. Ellison, Roy Kellog and John Currie.

The Gulf Refining Co., Dallas, Tex., will build a new distributing plant at a cost of \$200,000. The buildings will be of concrete and will include a machine shop.

The electric light plant and ice factory of the Commonwealth Light & Power Co., Jacksonville, Tex., recently destroyed by fire, with a loss of \$100,000, will be rebuilt.

The Conners Steel Co., Birmingham, Ala., will build a 77 x 400 ft. addition to cost about \$50,000.

The Kansas City Structural Steel Co., Kansas City, Mo., contemplates establishing a branch plant at Tampico, Mexico.

The Wichita Falls, Ranger & Fort Worth Railroad, Wichita Falls, Tex., plans to build shops at Ranger, Tex.

The electric light and waterworks plant of the Laporte Light, Water & Ice Company, Laporte, Tex., recently destroyed by fire, will be rebuilt at a cost of \$20,000.

The Rising Star Light & Power Co., Rising Star, Tex., has been incorporated with a capital of \$15,000 by W. L. Felt, J. E. Lewis and J. R. Edison.

The Pacific Northwest

SEATTLE, Oct. 19.

A slight improvement in general manufacturing lines was noted the past week and several new projects and inquiries have come before the trade. The demand for second-hand machinery is good but new equipment continues to move slowly.

The Oregon-Washington Railroad & Navigation Co., Portland, is building a dock, 80 x 400 ft., at Astoria at a cost of \$80,000. Special freight-handling equipment will be installed. Sam Murry, Portland, is chief engineer.

The Howard Pulp & Paper Co., which plans construction of a paper mill at Idaho Falls, Idaho, will start work at once on the plant. It will have annual output of 60,000 tons of paper. Paul H. Hollinz is president.

The Doud-McFarlane Machine Co., Tacoma, has purchased a site on which it will erect a plant to cost \$100,000. It will include a foundry, 80×300 ft., costing \$50,000; a galvanizing and pattern shop to cost \$25,000, and a manufacturing department, 50×170 ft., to cost \$25,000.

Wentworth & Irwin, Portland, have been awarded a contract by the Government for constructing all the United States mail wagon bodies for the territory west of the Mississippi River, the contract totaling more than \$75,000.

The Northwest Priseler Co., Portland, recently incorporated for \$100,000, plans the establishment of a machine shop and garage. William L. McDonald is president.

The Boeing Airplane Co., Seattle, has been awarded a contract by the Government for the manufacture of spare airplane parts.

Canada

TORONTO, Oct. 25.

The demand for machine tools in this market continues to show improvement, although the greater part of the business is made up of single machines and small lists. iron and steel makers who have been erecting foundries and additions are about ready to enter the market for equipment. During the week a number of pulp and paper companies made known their intention of adding to present plants or building new ones, and it is expected that within the next three or four months they will come into the market with good sized lists. Other manufacturers who have had construction under way since early spring are also about ready to place their requirements. It is the general opinion that price reductions will not materialize for some time and that lower quotations would not bring any more business. Those who are buying now have held off as long as possible and are urgently in need of the equipment they are pur-

The strike of the coal miners in Great Britain is having some effect on deliveries from that country and if it should last for any considerable time there will be a shortage in material from across the ocean. Deliveries from the United States have shown a decided improvement in the last two months and dealers here state they can give prompt shipment on many lines.

The plant of the Equator Mfg. Co., Bay Street, Hamilton, Ont., manufacturer of electrical equipment was damaged by fire Oct. 18, with a loss of \$25,000. The property of the Hamilton Lamp Co., 146 York Street, the machine shop of M. F. Ireland, 150 York Street and several other buildings were more or less damaged at the same time.

The Fulton Motors, Ltd., has taken over the factory of the Marathon Rubber Co., St. Catharines, Ont., which it will remodel and enlarge for the manufacture of motor trucks.

Construction has started on a ground pulp mill at Nipigon, Ont., for the Nipigon Fibre & Paper Co., Port Arthur, Ont., to cost \$500,000.

The Provincial Paper Mills, Ltd., 54 University Avenue, Toronto, has purchased the plant of the Port Arthur Pulp & Paper Co., Port Arthur, Ont., and will make improvements and install additional equipment next year.

The Ruggles Motor Truck Co., London, Ont., has placed contracts for the erection of a motor truck factory to cost \$200,000.

Contracts have been awarded in connection with a power house costing \$10,000 for the Canadian Westinghouse Co., Ltd., Hamilton, Ont.

The Congoleum Co., Ltd., 1270 St. Patrick Street, Montreal, has let contract to D. G. Loomis & Son, Ltd., 211 McGill Street, for the construction of a boiler house to cost \$18,000.

The Dyrob Steel (Consolidated), Ltd., Toronto, has been incorporated with a capital stock of \$1,000,000 by James R. Roaf, room 203, 95 King Street East; William C. Cope, 122 Wellington Street West; John Creighton and others to manufacture machinery, castings, forgings, etc.

Kinsinger-Bruce, Ltd., Niagara Falls, Ort., has been incorporated with a capital stock of \$250,000 by William H. McGuire, 60 Victoria Street; George F. Rooney, 204 Sunnyside Avenue; Homer W. Raylor and others all of Toronto, to manufacture machinery, tools, car fittings, etc.

The Central South

Sr. Louis, Oct. 25.

The St. Louis Malleable Casting Co., 7701 North Conduit Avenue, St. Louis, has awarded a contract to the Fruin & Colnon Co., Merchants' Laclede Building, for a one-story foundry, 100 x 465 ft. Charles G. Ette is general manager.

The Chicago, Rock Island & Pacific Railroad, Chicago, has awarded contract to T. S. Leake & Co., 608 South Dearborn Street, for machine and repair works, 50 x 60 ft., and engine house, 50 x 50 ft., at Eldorado, Ark.

The Farmers' Wheel Rake Co., Glasgow, Ky., has been incorporated with a capital of \$50,000 by J. A. Burks, J. R. Spurling and O. B. Gentry, to manufacture agricultural implements and equipment.

The Carrs Fork Coal Co., Allcott, Ky., is planning for the installation of electrical machinery at its coal properties to cost about \$50,000.

The Emil Sieloff Packing Co., St. Louis, will equip a packing plant to cost about \$500,000, and install refrigerating and power house equipment.

The Stimpson Computing Scale Co., Snead Building, Louisville, is said to be arranging for additions to its plant,

The Kansas City Power & Light Co., Kansas City, Mo., is arranging an appropriation of \$4,000,000 for extensions and improvements in its electric power plants and system.

The Mountain Grove Creamery, Ice & Electric Co., Mountain Grove, Mo., has plans under way for a new hydroelectric power plant to furnish service to Willow Springs, Mountain Grove and other points. The company has recently increased its capital from \$150,000 to \$500,000.

The Du Bols Rubber & Tire Co., Chattanooga, Tenn., is having plans prepared for a new plant.

The Mutual Enamel Works Co., Chattanooga, Tenn., has awarded contract to Dwight P. Robinson & Co., Inc., 125 East Forty-sixth Street, New York, for a number of buildings, including a foundry, estimated to cost about \$100,000.

The Wright-Dance Range & Furnace Co., Knoxville, Tenn., has been incorporated with a capital of \$25,000 by R. F. Wright, J. M. Dance and C. O. Pennington, to manufacture stoves and ranges.

The Diamond Grid Battery & Electric Co., Ashland, Ky., has been organized by C. F. Higgins and J. H. Briant to manufacture electrical batteries and similar equipment.

OFFICE CHANGES

The Pittsburgh office of Naylor & Co., New York, formerly located at 799 Union Arcade Building, has moved to Room 903 of the same building.

The Lancaster Steel Products Corporation, Lancaster, Pa., has opened a New York office in the National Association Building, at 25 West Forty-third Street, in charge of L. E. Vesey as Eastern sales manager. Mr. Vesey goes to New York from the Chicago office, where he has been engaged for the past year and a half.

The address of George Oldham & Son Co., Frankford, Philadelphia, has been changed to Scott and McHenry streets, Baltimore, Md.

Announcement has been made of the formation of a partnership for the purpose of dealing in iron, steel, coal and coke, by H. D. Stalnaker of the Stalnaker Steel Co., and S. P. Broome, formerly assistant general manager of sales of the A. M. Byers Co., Pittsburgh. The announcement is dated Oct. 1. Offices of the firm are located at 322 Frick Building, Pittsburgh.

INDUSTRIAL FINANCES

Report of Pittsburgh Coal Co. Shows Slight Decline in Earnings for Year

The pamphlet report of the Pittsburgh Steel Co. for the your ended June 30 last has been issued and despite smaller dishursements upon the common stock, shows that the company was able to carry to its surplus account only about 60 per cent the sum of the previous year. The decline in the net earnings from operations was a matter of only \$137,219 the total earnings of but \$159,117, but the company spent \$2,806,855 for repairs and maintenance; it sustained a loss of \$250,597 in the sale of Liberty bonds; had to reserve for income and excess profits taxes a sum \$360,639 greater than in the previous year and total deductions from earnings exceeded those of the previous year by \$650,971. surplus for the year amounted to \$66,459, as compared with \$1,126,547 in the previous year.

The income account of the company makes the following

comparison with that of the year ended June 30, 1919:

	1920	1919	Decrease
Net earnings after operating, repair and maintenance			
charges\$3,5	930,645	\$4,067,864	\$137,219
	165,886	196.625	30,739
Other revenue	69,665	60,824	*8,841
Total earnings\$4.1	66,196	\$4,325,313	\$159,117
Reserve plant depreciation 1,0	00,280	1,205,171	204,891
Reserve mine depletion 1	26,026	70,263	•55,763
Loss sale of Liberty bonds 2	50,597		*250,597
Reserve to cover depreciation			
Liberty bonds written			
down to market price			
June 30, 1920	88,690		*88,690
	04,690	244,051	*360,639
Interest deferred payments			
for Alicia property 1	34,455	34,281	*100,174
Total deductions\$2,2	04,738	\$1,553,766	*\$650,971
Net income\$1,9	61,459	\$2,771,547	\$810,088
On preferred stock 7	35,000	735,000	
	60,000	910,000	350,000
Total\$1,2	95,000	\$1,645,000	\$350,000
Surplus 6	66,459	1,126,547	460,088

*Increase.

The condensed profit and loss statement of the Pittsburgh Steel Co. and its subsidiaries for the year is as follows:

Net sales\$27,483,107	
Operating expenses	
Gross operating profits 3,576,338	
Sales and administrative expenses 771,999	
Net operating profits 2,804,339	
Other income 235,551	
Total net income	\$3,039,890
Deductions, exclusive of dividends 1,078,432	
Dividends 1,295,000	
Total deductions	2,373,432
Surplus	\$666.458

Total value of the products shipped from the plants of the company during the year was \$27,752,221, as compared with \$31,265,012 in the previous year. Inventory as of June 30, was \$7,325,827, as against \$7,834.342 on the same date in 1919. Capital expenditures for betterments and improve-ments and in the acquisition of additional property, less redits for property sold, in net amounts were as follows: Steel plants, \$286,980; coal properties, \$162,661; fuel transportation, \$157,656, a total of \$607,296, less \$53,985 for xtraordinary replacements charged to operation, leaving net expenditures charged to the capital account of \$553,312. The average number of employees at the steel works was 4158, and at the coal properties 858, as compared with 4274 and 838 respectively, in the previous year, and the payroll was \$10,454,007, against \$9,575,815 in the previous year, the increase being explained in part by a 10 per cent wage inrease made Feb. 1, in line with the action taken throughout Unfilled orders amounting to 186,692 the steel industry. ons, with a value of \$13,771,921, were upon the books of company as of June 30, as compared with 91,631 tons,

with a value of \$6,724,556 on the corresponding date in 1919. In his remarks to the stockholders, President John Bindby says that operations of the plants were seriously ham-

pered by the labor disturbances in the iron and steel industry, by the strike of the bituminous coal miners and by the dis ruption in transportation service, which find reflection in the The general market for iron and steel, he says, earnings. continued most satisfactory throughout the fiscal year and until August, 1920, when there began to be some let-up in trade. The results of the operation of the company's coal properties have fully met the expectations of the directors, and drawing attention to the fact that both the coal properties and the company's plants are located on the Monongahela River, President Bindley predicts a considerable saving when improvements now under way are completed. The company owns one-fourth interest in the Mesaba-Cliffs Iron Mining Co., which to June 30, 1920, represented an investment of \$500,000. The company has erected 25 dwellings for employees of the Monessen plant, 14 of which have been sold at cost on long-time payment plans. The company paid regular quarterly dividends of 1% per cent on the preferred stock and of 2 per cent on the common stock. At a special meeting of the stockholders held July 20, 1920, an increase in the capital of \$7,000,000, represented in 70,000 shares of common stock, was approved, to be distributed as a dividend to holders of the common stock,

Directors of the King Motor Co., Detroit, manufacturer of automobiles, have filed a petition in the Wayne County Circuit Court setting forth notice of dissolution of the company and asking the appointment of a receiver. The assets are stated as \$1,835,772 and liabilities, \$1,097,070. The company's directors include Artemas Ward, Sr. and Jr., William B. Nesbitt and Frank W. Doolittle, New York, and Frederick I. Rennert, Boston.

The Steel Age Mfg. & Supply Co., 28-32 Liberty Street, Battle Creek, Mich., has been granted permission by the Michigan Securities Commission to increase its capital stock by \$150,000. Most of the present stock is held locally. company handles mill and factory supplies in Battle Creek. Kalamazoo, Jackson, Coldwater and nearby towns.

Iron and Industrial Stocks

Several favorable influences started stocks upward toward the close of the week after depressing features had done their work earlier. The situation in Great Britain where it seemed as though the railroad men would strike sympathetically with the coal men cast a shadow upon the stock market. However, when the coal miners expressed themselves as not favoring a sympathetic strike, there was a brightening in outlook.

On the heels of the favorable financial report of the Lackawanna company came the report of the Republic Iron & Steel Co., which showed net for the third quarter alone of over 90 per cent of the total for the preceding six months. The report of the American Locomotive Co. for the third quarter showed earnings as large as combined earnings of the two previous quarters

The most interesting financial feature is the success of foreign bond offerings, which are heavily oversubscribed. All this financing tends to make the exchange situation better, which in turn promises more export business for American manufacturers.

The range of prices on active iron and industrial stocks from Saturday of last week to Monday of this week was as

Allis-Chalm, com. 34 Allis-Chalm. pf.. 76 - 77 Am. Can com... 33 - 33% Am. Can pf.... 87% - 87% Am. C. & F. com.133%-135 C. & F. pf.109 -11036 Am. Loco. com., 95½-97¼
Am. Loco. pf...100½-100½
Am. Steel F. com., 37½-38½
Am. Steel F. pf.. — - 85 Bald, Loco. com. 112 % -115 % - 981/4 - 68 Bald. Loco. pf.. -Beth. Steel, com. -Beth. Stl., Cl. B. 70 Beth. Stl., 8% pf.104 14-105 Chic. Pneu. Tool. 781/4- 791/4 Colo. Fuel..... 341/4 - 341/2 Cruc. Steel com.128 -1311/4 Cruc. Steel pf... — 93 Gen. Electric....137%-141% Gt. No. Ore Cert. 34% - 34% Gulf States Steel. 49 - 50% Int. Har. com...106 -109½
Int. Har. pf.... — -109
Lackawanna Stl. 63%- 65%

Lake Sup. Corp. 11 - 1114 Midvale Steel.... 38 - 38 1/4 Nat.-Acme 32 1/4 - 33 Nat. E. & S. com. — - 33 N. Y. Air Brake. 95% - 95% Nova Scotia Steel. 40 - 40 1/2 Pressed Stl. com. 96 - 97 1/4 Pressed Steel pf. --1001/4 Ry. Stl. Spg. com. 95% - 97 Ry. Stl. Spg. pf. — -105 Replogle Steel... 75 - 81 - 811/4 Republic com... 76½-78% Republic pf.... 92%-94 Sloss com..... 65 - 67% Superior Steel... 49% - 50% Transue William Transue-Will'ms 431/2 - 44 Un. Alloy Steel. 37% - 39 U. S. Pipe com.. 13% - 14 S. Pipe pf... . U. S. Steel com. . 87 \% - 89 \% U. S. Steel, pf. . 108 \% - 109 \% Vanadium Steel. 62 1/4 - 65 Va. I. C. & Coke. -Westingh'se Elec. 46%-47%

Current Metal Prices

On Small Lots, from Merchants' Stocks, New York City

The quotations given below are for small lots, as sold from stores in New York City by merchants carry-

ing stocks.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipment in carload lots from mills, these prices are given for their convenience.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of The Iron Age under the general heading of "Iron and Steel Markets" and "Metal Markets."

Iron and Soft Steel Bars and Shapes	Steel Wire
Dars: Per Lb.	Base Price* on No. 9 Gage and Coarser Per Lb.
Refined iron, base price 5.50c.	Bright basic10.00c
Swedish bars, base price20.00c.	Annealed soft10.00c.
Soft Steel:	Galvanized annealed
% to 1% in., round and square3.48c. to 4.75c.	Coppered basic. 10.50c. Tinned soft Bessemer. 12.00c.
1 to 6 in. x % to 1 in	Timed soft bessemer12,00c.
1 to 6 in. x \(\frac{1}{4} \) to 5/16	*Regular extras for lighter gages.
Rods—% and 11/163.53c, to 5.45c.	Brass Sheet, Rod, Tube and Wire
Bands—1½ to 6 by 3/16 to No. 84.18c. to 7.00c.	BASE PRICE
Hoops	High brass sheet
Shapes:	High brass wire
	Brass rod
Beams and channels—3 to 15 in3.58c. to 4.50c.	Brass tube
Angles:	Copper Sheets
3 in. x 1/4 in. and larger3.58c. to 4.50c.	Sheet copper, hot rolled, 24 oz., 26 1/2 c. to 27 1/2 c. per
3 in. x 3/16 in. and 1/8 in	lb. base.
1½ to 2½ in. x % in	Cold rolled, 14 oz. and heavier, 2c. per lb. advance over
1½ to 2¾ in. x 3/16 in. and thicker3.58c. to 4.85c.	hot rolled.
1 to 1¼ in. x 3/16 in	Tin Plates
1 to 11/4 in. x 1/8 in	Bright Tin Coke—14x20 Primes Wasters
7/8 x 7/8 x 1/8 in	Grade Grade OO IL 011 00 011 5
% x % in	"AAA" "A" 80 lb\$11.80 \$11.55 - Charcoal Charcoal 90 lb 11.90 11.65
5% x ½ in	14x20 14x20 100 lb 12.00 11.75
½ x 3/32 in	IC\$16.50 \$14.25 IC 12.25 12.00
Tees:	IX 18.75 16.25 IX 13.25 13.00
1 x 1/8 in	IXX 20.50 18.00 IXX 14.25 14.00
$1\frac{1}{4}$ in. x $1\frac{1}{4}$ x $3/16$ in3.88c, to 5.80c.	IXXX 22.25 19.75 IXXX 15.25 15.00
1½ to 2½ x 3/16 in, and thicker3.68c. to 5.60c.	IXXXX 23.75 21.50 IXXXX 16.25 16.00
3 in. and larger	Terne Plates
Merchant Steel Per Lb.	8-lb, Coating 14 x 20
Tire, 1½ x ½ in. and larger	100 lb \$ 9.35
(Smooth finish, 1 to 2½ x ¼ in. and larger)5.90c.	IC 9.50
Toe calk, ½ x % in. and larger	IX 10.50
Cold-rolled strip (soft and quarter hard) 12c. to 14c.	Fire door stock
Open-hearth spring steel7.00c. to 10.00c.	Tin
Shafting and Screw Stock:	Straits pig
Rounds	Bar
Squares, flats and hex6.75c. to 7.50c.	Copper
Standard cast steel, base price15.00c.	Lake ingot
Best cast steel	Electrolytic
Extra best cast steel25.00c. to 30.00c.	Casting 18c.
Tank Plates-Steel	Spelter and Sheet Zine
1/4 in. and heavier	Western spelter
Sheets	Sheet zinc, No. 9 base, casks15c. open 15½c.
Blue Annealed Per Lb.	American pig lead
No. 10	Bar lead9½c. to 10½c.
No. 127.28c. to 8.35c.	Solder, ½ and ½ guaranteed30c.
No. 14	No. 1 solder
No. 167.45c. to 8.50c.	Refined solder23½c.
Box Annealed—Black	
Soft Steel Wood's	 Prices of solder indicated by private brand vary according to composition.
C.R., One Pass Refined,	Babbitt Metal
Per Lb. Per Lb. Nos. 18 to 20	Best grade, per lb
Nos. 18 to 208.40c. to 9.90c. Nos. 22 and 248.45c. to 9.85c. 10.80c.	Commercial grade, per lb
No. 26	Antimony 91/0 to 01/0
No. 28	Asiatic
No. 308.70c. to 10.10c.	Aluminum
No. 28, 36 in. wide, 10c. higher.	No. 1 aluminum (guaranteed over 99 per cent
Galvanized Per Lb.	pure), in ingots for remelting, per lb35c. to 38c.
No. 14.3	Old Metals
No. 14.4	The market is suddenly declining and practically
Nos. 18 and 20	no business is being transacted. Quotations are en-
Nos. 22 and 24 9.40c. to 11.55c.	tirely nominal. Dealers' buying prices are as follows:
No. 26	Cents
No. 27 9.70c. to 11.85c.	Conner hoovy and awaible 12.50
No. 289.85c. to 12.00c.	Copper, heavy and crucible
No. 3010.35c. to 12.50c.	Copper, light and bottoms
No. 28, 36 in. wide, 20c. higher.	Brass, heavy
Pipe	Brass, light 5.19
Standard—Steel Wrought Iron	Heavy machine composition
Blk. Galv. Blk. Galv.	No. 1 vellow brass turnings
½ in. Butt34 -17 34-1½ in. Butt 3 +17	No 1 red brass or composition turnings
$\frac{3}{4}$ -3 in. Butt. -38 -22 2 in. Lap + 3 +21	Lead heavy
$3\frac{1}{2}$ -6 in. Lap. -33 -18 $2\frac{1}{2}$ -6 in. Lap. $+1$ $+17$	Load too 4.00
7-12 in. Lap $-23 - 6$ 7-12 in. Lap $+12 +30$	Zine 4.25
11	76

